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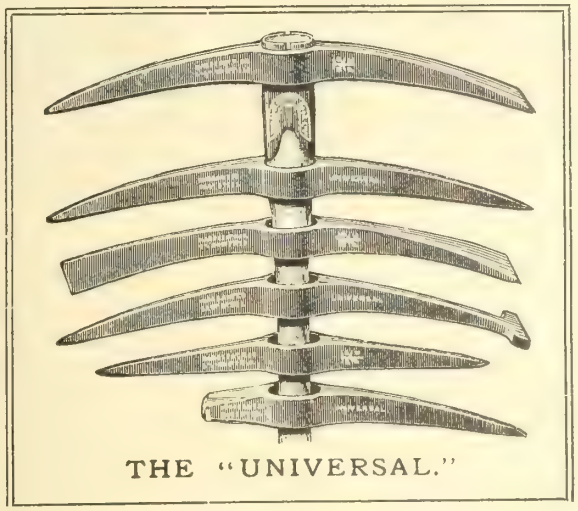
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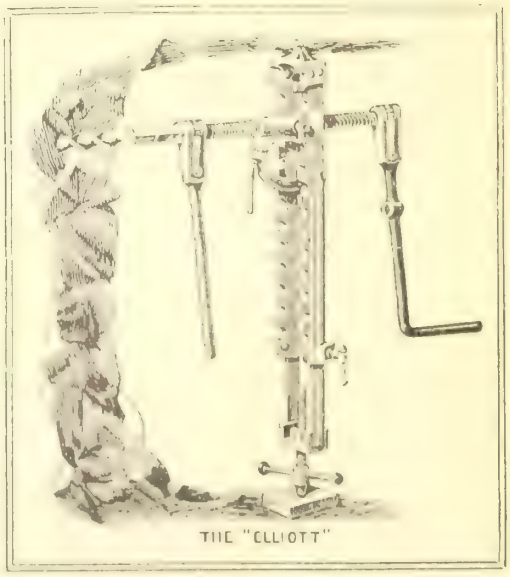
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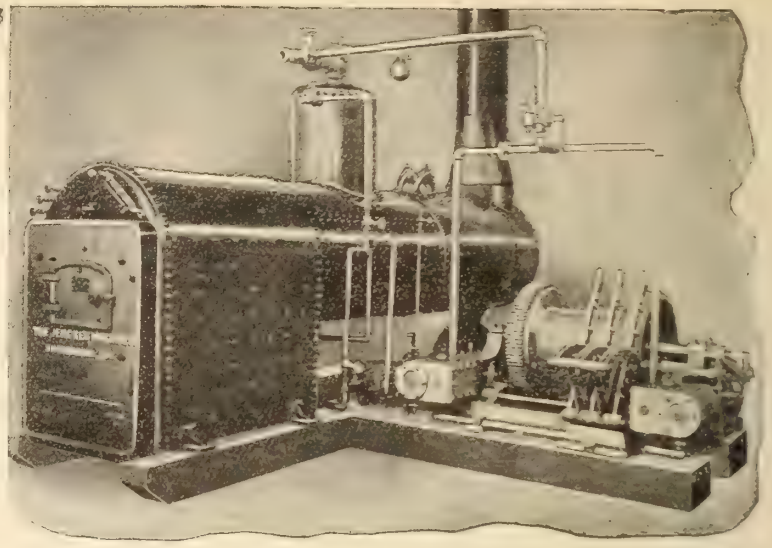


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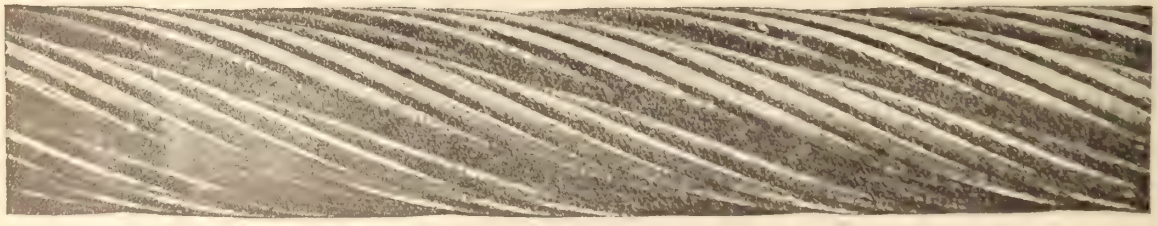
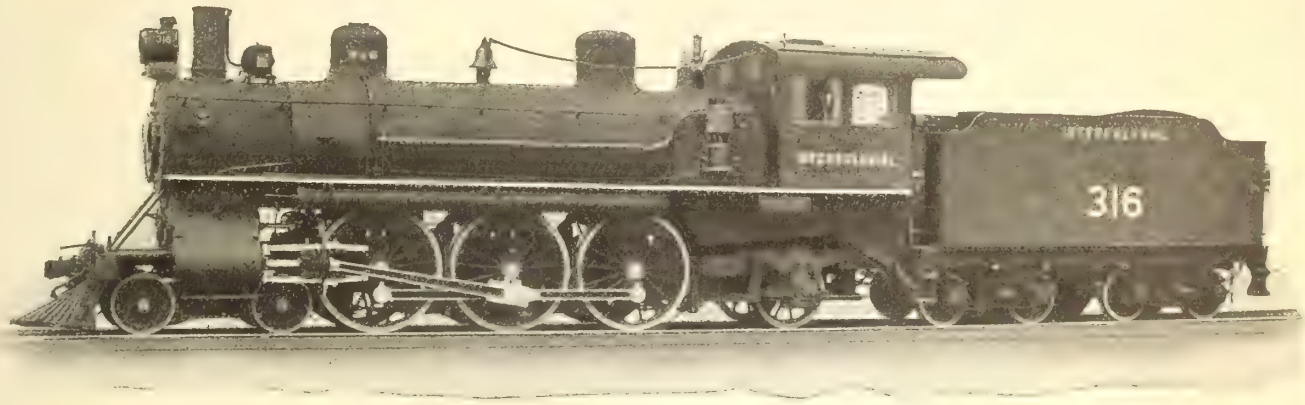


Illustration of Winding Rope, 240 fms. long x 3½ circ. Galvanized Special Improved Patent Steel. Compound Make, supplied to Kenneil Collieries, Bo'ness, Scot., which gave a record life of 6 years and 2 months. Showing condition when taken off.

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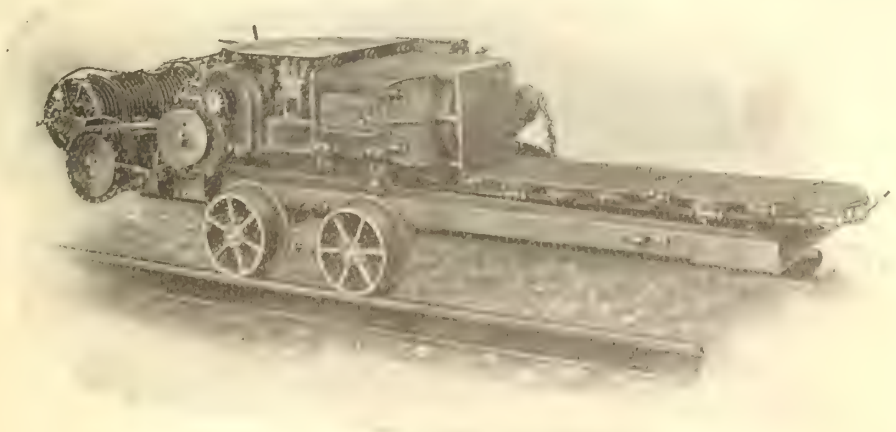
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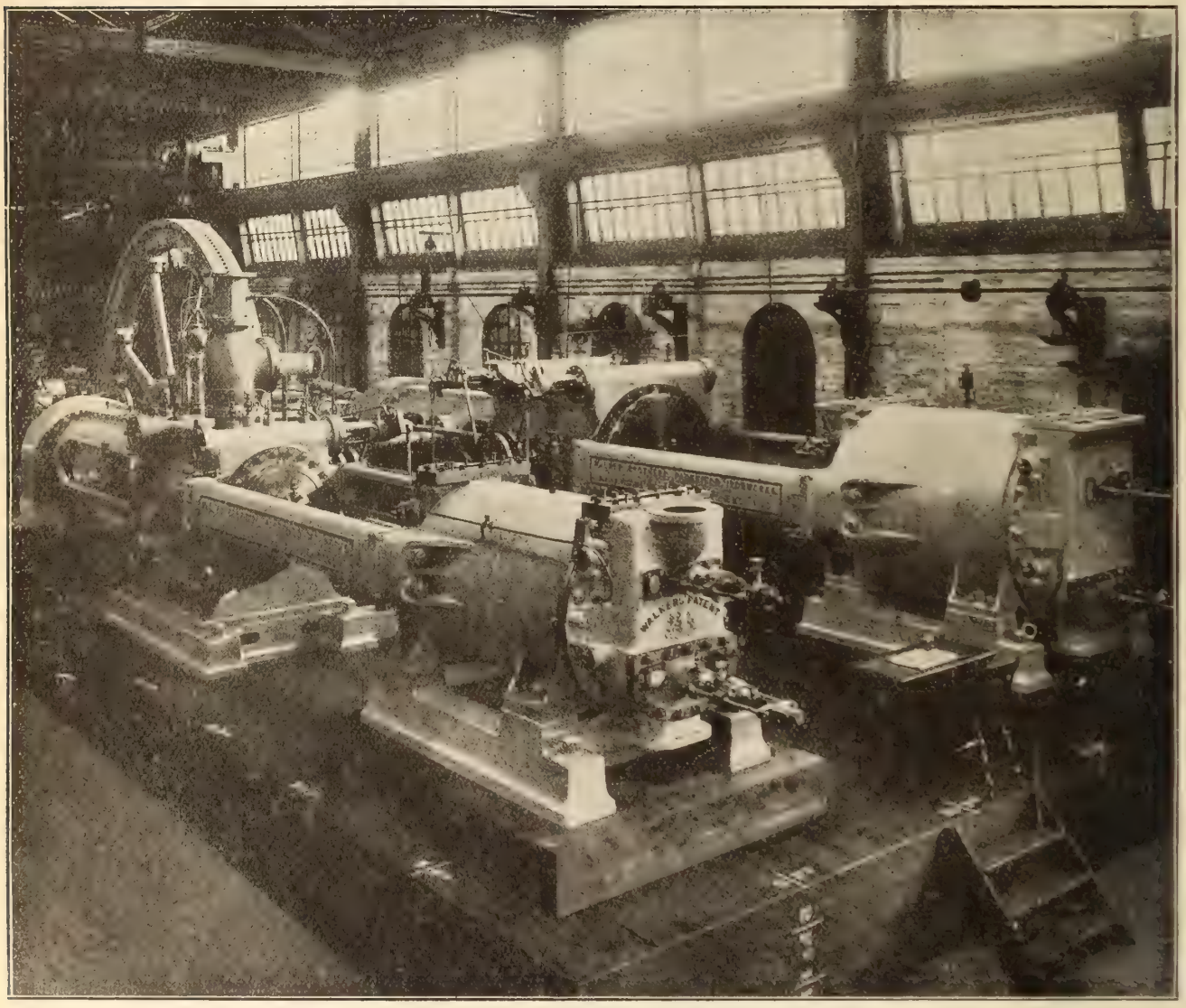
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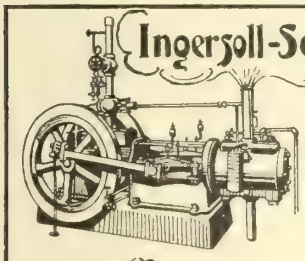
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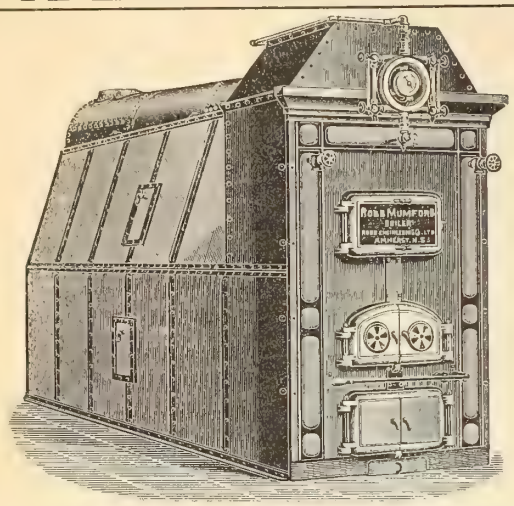
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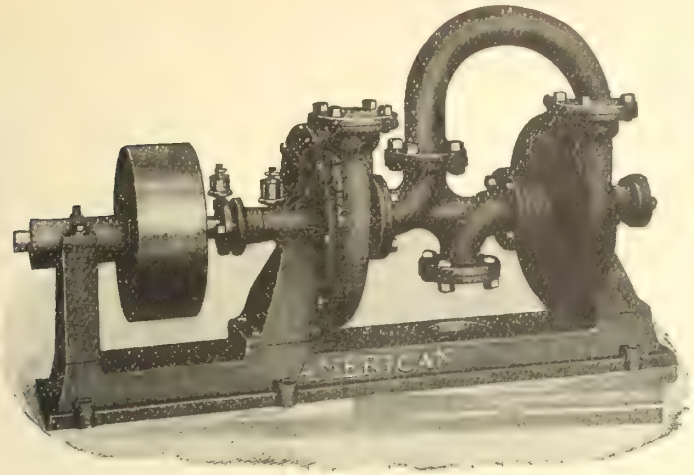
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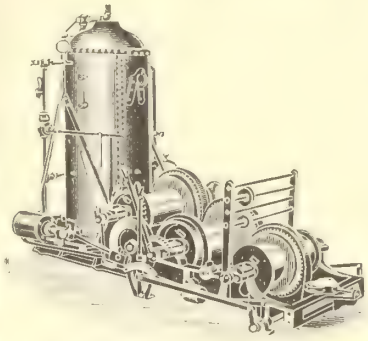
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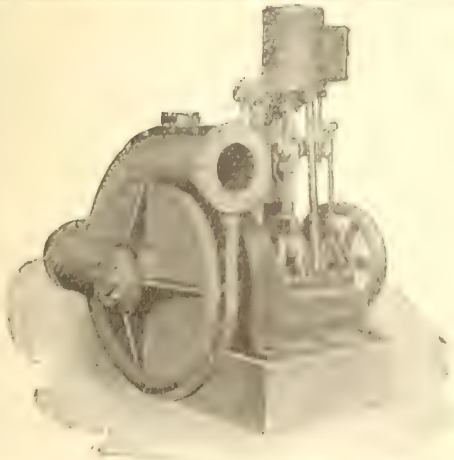
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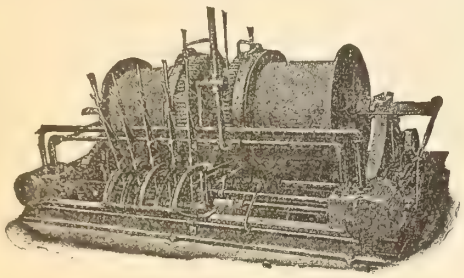
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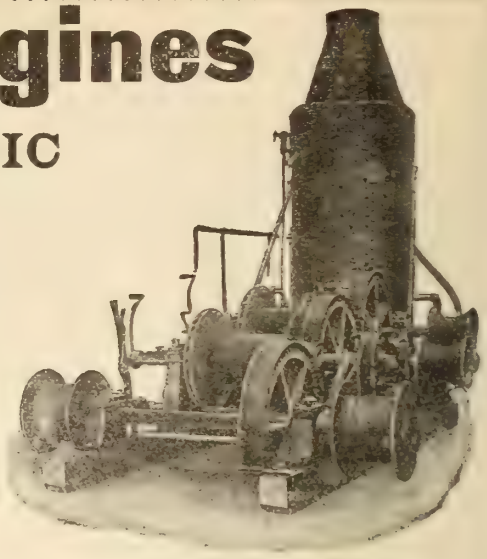
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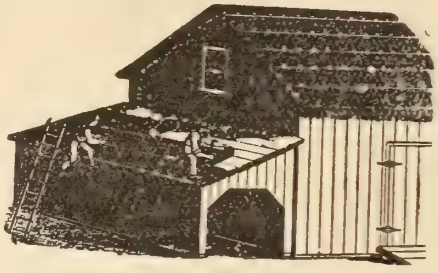
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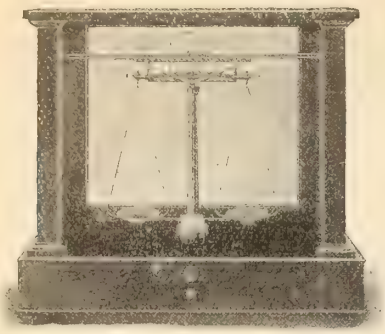
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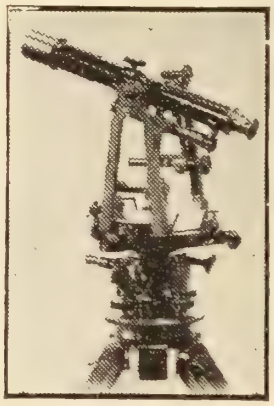
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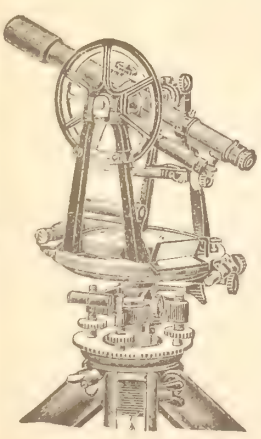
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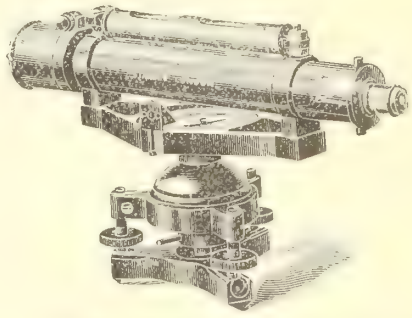
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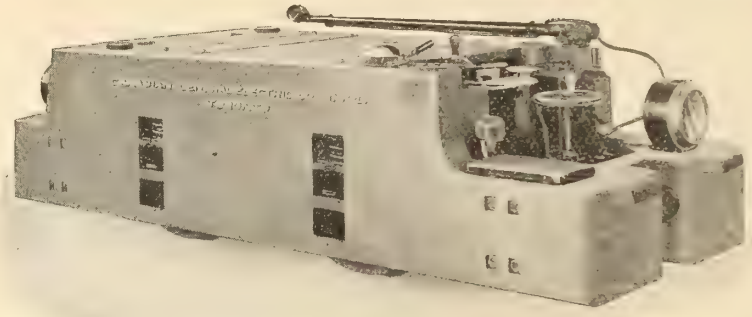
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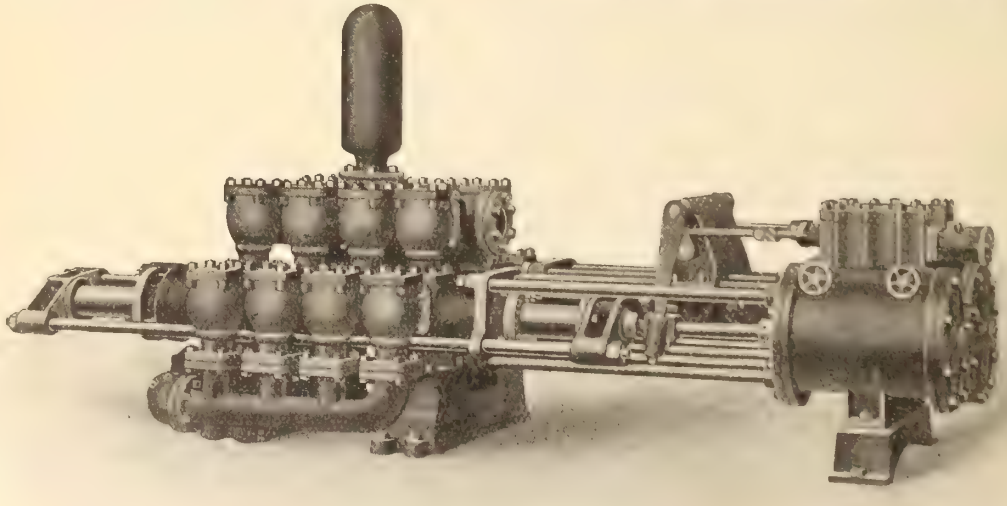
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THE SIXTEENTH ANNUAL REPORT OF THE ONTARIO BUREAU OF MINES.

This report, noticed at length on other pages of this issue, is a clean and creditable volume. The first part only has appeared so far. The second part, a revision up to date of Dr. Miller's Cobalt pamphlet, accompanied by a new geological contour map of Coleman, is yet in the press. Perusal of Part I. induces several conclusions. Most important of these is the conviction that the Bureau of Mines is overworked and undermanned. Ontario is a magnificently large country. In her northern areas travel and transportation are beset with difficulties. Mineral industries of many kinds and of all degrees of importance and promise are spread all over the Province. In three years Ontario's mineral production has increased by 67 per cent.

It is therefore not inappropriate to suggest that this almost startling growth demands a corresponding expansion of the Bureau of Mines.

The present officials of the Department of men of long experience, of unquestioned trustworthiness, and of more than provincial reputation. Under the Hon. Mr. Cochrane's administration of the Department, a vigorous advertising campaign has been instituted. It is due to this policy that English capital, in large amounts, has been invested and is now being placed in the Cobalt district. In Deputy Minister Gibson the Province has a servant whose unremitting industry and intelligent zeal are fully appreciated only by those who happen to know the magnitude of his labors. Dr. W. G. Miller, the Provincial Geologist, ranks with the most distinguished scientists of the continent. Of the other members of the Bureau's staff it is enough to say that they are thoroughly imbued with the spirit of enthusiam and loyalty that marks their superiors. The whole staff works together in a manner as creditable as it is unusual.

But neither efficiency nor industry can accomplish the impossible. The work is rapidly assuming proportions far beyond the Bureau's capacity.

We therefore would respectfully impress upon the Provincial Government the present need of strengthening and assisting the Department of Mines.

There are several directions in which expansion can be recommended.

The summer classes, conducted in the mining camps for the benefit of prospectors and others, could be enlarged and, in some districts, made permanent.

The duties of the Provincial Geologist and of the Deputy Minister should be lightened. Much of their time is now wasted on official minutiae, which could be looked after by cheaper men.

The system of inspection should be expanded. It is hardly possible that one official can keep a paternal eye upon all the mines of Ontario. In fact the attempt of one man to cover all the Province implies the waste of a disproportionately large amount of time in travelling. Hence, some arrangement that would give the present inspector the power of appointing local assistant inspectors for the more important mining districts should be considered.

These are a few, possibly quite enough, of the improvements that present conditions and the promise of the immediate future demand.

THE STATUS OF PROVINCIALLY INCORPORATED COMPANIES.

A decision of considerable importance in its bearing upon the powers of mining and other companies organized under Provincial charters of incorporation was given by the Supreme Court of Canada on December 13th in the appeal case of the Canadian Pacific Railway Company vs. the Ottawa Fire Insurance Company. The case involved several technical issues, the point raised in connection with the appeal being the right of a company chartered by the Province of Ontario to do business outside of its boundaries. At the trial both the Dominion Government and the leading Provinces were repreesnted by counsel, the Department of Justice upholding the contention of the plaintiffs, that Provincially incorporated companies must confine their operations to the Provinces from which they hold charters. By a majority of four to two the Supreme Court overruled this view and dismissed the appeal, thereby establishing the right of Provincial companies to do an extra-Provincial business. It is fortunate for the mining interests of the country that this conclusion was reached, as otherwise the great majority of the mining companies that are operating under Provincial charters, would have been under the necessity of becoming reincorporated at Ottawa, and their business would have been subjected to great confusion owing to the raising of questions as to validity of contracts, etc. The effect abroad of such a limitation as was sought to be imposed would have been exceedingly damaging. The loss to the Province of Ontario in annual revenue by forcing companies to take out Federal instead of Provincial charters would have been about $200,000.

COAL MINE FATALITIES.

One of our Nova Scotian correspondents, Mr. F. W. Gray, has described, in former issues of THE CANADIAN MINING JOURNAL, the introduction of modern rescue apparatus in the collieries of the Dominion Coal Company.

Three terrible coal mine disasters have taken place in the United States within the past month. These might never have occurred had proper precautionary measures been taken.

But as a sad object lesson they must be given deep consideration by Canadians. Canada's coal mining industry is expanding rapidly. The right time to meet the situation is now. It is surely unnecessary to wait until tragedies in our own mines have lent sad emphasis to our responsibilities as a nation.

Nor should this work be left to the humane enterprise of private corporations. As pointed out before, the Dominion Coal Company has availed itself of the latest and best experience and has spared neither time nor money in providing for the safety of its workmen. But, if a private corporation is enlightened enough to recognize its duty, it all the more strongly accentuates the fact that upon the nation as a whole rests the final responsibility.

Neither industrial power, nor political prestige is as important as human life. It were better for Canada to remain forever stationary than by indifference or lust of power to sanction the slaughter of her citizens.

The recognition and investigation of questions such as this, questions vital and immediate, involving the safety of thousands of our fellow-citizens, might most properly engage the attention of the Mines Branch of the Federal Department of Mines.

There would then be no need of duplicating in any respect the work of the Geological Survey.

A UNITED STATES BUREAU OF MINES.

President Roosevelt in his message to the Congress of the United States recommended the creation of a Bureau of Mines.

Commenting upon this, the *Mining and Scientific Press* sounds a note of warning. "It is proposed," says the *Press*, "to put the Bureau of Mines in the Department of the Interior, and this suggests the recognition of geological primogeniture. In any event, we hope that in the effort to make a new departure of uncertain value, nothing will be done calculated to impair the usefulness of an established organization of such unquestioned help to mining development as the Geological Survey. Let us have a Bureau, or a Department of Mines, as may seem best, but let it not further emasculate a technological body, the products of which have been honor to the American application of science to industry."

These sentiments apply aptly to the situation in Ottawa. Miserably regrettable conditions will be sure to follow the lopping off of any of the functions of the Geological Survey.

LEGAL DEFINITIONS OF "MINERAL" AND "ORE" IN THE UNITED STATES.

This is the title of an interesting chapter in an interesting book, reviewed on another page of this issue.

Definitions of the words "mineral," "ores," etc., have been variously affected and effected under the common

law and State statutes, under the Federal mining and land laws and under the United States customs laws.

The meanings of the words "minerals" and "ores" have been fruitful sources of litigation. From the famous case of Hartwell vs. Cammon, decided in New Jersey in 1854, arose the dictum that it is not necessary for a substance to contain a metal to be embraced within the term "mineral."

It is now a settled legal principle in the United States that petroleum and natural gas are "minerals." In conveyances and contracts they are comprised in that term. But for a long time this point was unsettled. In fact at one time the Pennsylvania Supreme Court decided that, since in popular estimation petroleum is not regarded as a mineral substance, therefore in all contracts the view of the mass of mankind should hold. This view did not long obtain.

Coal always has occupied a well-defined place as a mineral. The question of its inclusion in mineral grants and reservations has rarely been a cause of dispute. But, curiously enough, iron pyrites mixed with the coal, if brought to the surface and separated from the coal, belongs to the owner of the land, who can recover the value of the pyrites at such place "less the cost of mining the same and separating it from the coal."

Water, though strictly a mineral, is not included by the law under that term. Clays, of all varieties, considered in England as minerals, have not been legally classified in the United States.

The legal definition of the word "mineral," when used in deeds, leases or other legal instruments in the United States, may be summarized as follows:—

"In the absence of special provisions, it includes all metallic minerals of sufficient value to justify mining and extracting the same, whether for the purpose of reducing the metal therefrom or some other industrial use. It also includes rock used for building material, etc., coal, petroleum and natural gas."

The word "ore" has been legally defined as designating a compound of metal and other substances—a loose and quite valueless definition. Better is this description: An ore is a mineral or mineralized rock than can be profitably mined.

Editorial Notes.

With the December 5th issue of the *Mining Reporter* the name and style of our Denver contemporary will be changed. The two periodicals, the *Mining Reporter* and *Ores and Metals,* have been consolidated . Hereafter, under the name of *Mining Science* the new weekly will appear. The Canadian Mining Journal offers its congratulations and good wishes.

In this issue of The Canadian Mining Journal the whole text of Mr. Brock's report on Larder Lake is reprinted. This has been considered advisable for two reasons—firstly, because the report is one of major importance and of public interest; secondly, because it is so succinct and compressed that further condensing would be unfair to its author.

INDUSTRIAL EDUCATION.

W. L. Goodwin.

There is one aspect of this important subject which should receive the most careful consideration at the hands of our educational experts. An ever-increasing number of industries are conducted on a scientific basis which demands not only carefully educated managers, but also that the workmen and foremen shall be intelligent, acute and interested in their work through knowing the meaning of it. In the past these matters have been left to adjust themselves; but, with the keen competition and rapid improvements in processes so characteristic of the times, there has come the necessity for more methodical preparation for the life-work of the industrial rank and file. There are a number of directions in which progress can be made in Canada. The public schools may be so related to the industries prevailing in the district as to form a natural road not only to "the three R's," but to intelligent and effective production. The combination classes which are a feature of the Ontario public school system may be extended into the evening so as to keep up the educative process for a few years for those boys and girls whose circumstances make it necessary for them to begin wage earning at a comparatively early age. Doubtless evening schools have a limited value, but, with the shorter hours of work now prevailing, it is possible for bright lads to put in a few hours a week in study without overstrain. This is the right time to give careful consideration to such a subject. Our manufacturing industries are expanding rapidly, and calling insistently for a better supply of skilled labor. It would be hard to find better material for this supply than our Canadian youth, if they are given the opportunities for education which are open to the boys and girls in Germany, France, England, and other countries of the old world. Mr. Eustace Carey, in a recent presidential address to the Society of Chemical Industry, said in this connection: "So keenly do many manufacturers of my acquaintance feel as to the desirability of the continuation classes that they have made it a condition of employment when engaging boys that they shall attend a certain number of evening classes during the winter, the employers, of course, in these cases paying the fees." His reference is to the evening continuation classes of the technical schools. We commend this subject to the Manufacturers' Association.

Mr. Eugene Coste has returned to Toronto from a visit to Winnipeg and Vancouver and many intermediate points.

DEVELOPMENT OF NORTHERN CANADA.*

J. B. Tyrrell.

Northern Canada as here referred to is a title doubtless fairly well understood by all as defining that portion of Canada which lies north of the more thickly settled parts of the Provinces of Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, and which forms a great land mass stretching for 85 degrees of longitude across the centre of the North Temperate Zone in the Western Hemisphere. It is a country so vast that even those of us who have made a special study of it know little about it, except that its immensity and its vastness so completely overshadow all its other attributes in the mind of the traveller that he has great difficulty in descending to thoughts of the common details of existence, such as surround us in our daily life under ordinary conditions of civilization.

You have all heard the saying many times of late that last century was marked by the great progress of the United States; but that the progress and opening up of Canada will be the distinguishing features of this century.

On the 1st of January, 1901, the first day of this century, in the City of Dawson, during the almost sunless days of a very cold winter, spent within four degrees of the Arctic Circle, and surrounded by that advance guard of adventurous miners, thrown out into one of the coldest and least accessible parts of our northern country, I published a letter in the Dawson *Daily News*, in which that idea of faith in the coming progress and development of Canada was enunciated. Whether it had been stated before or not I do not know, but the idea had impressed itself upon me that while during the past century the United States had become fabulously rich by seizing and making use of its great natural resources, that now the conquest of our own north country had begun in earnest.

Dawson was but an outpost from which civilization would radiate into the surrounding wilderness, and it was but one of many centres which would soon be established by the enterprise of our people. The greatest extent of virgin territory in the world lies in Canada, and before the close of this century we will have learned how to make use of the vast store of natural resources of even the most inhospitable parts of the country.

Let us for a moment consider the value of the products of the whole of Canada at the present time. It is not my intention to weary you with figures and statistics. Any of you can look these up in the census reports for yourselves; but a few figures may be instructive. The total value of the natural products of Canada in 1901 was in round figures $519,000,000. Of this sum the agricultural and farm products were valued at $393,000,000; the forest products came next with a value of $51,000,000, while the mineral products were worth $48,000,000. Five years before that date, namely, in 1896, the minerals produced had only a value of $20,000,000; while five years later, in 1906, they had reached the large total of $80,000,000. Thus farming is as yet by far our most important industry. But mining has assumed a place second to it and is increasing rapidly every year.

Now with regard to Northern Canada, many of you here present will acknowledge that you know very little about it; but at the same time most of you will claim a fairly accurate knowledge of the industries of the Province of Ontario. This Province is considered one of the most fertile parts of the North American Continent, with its fields of yellow grain, its orchards loaded with golden fruit, and its splendid stock farms replete with the vitality and energy bred of the Canadian air. You are quite certain of this fact. You have seen it all as you have travelled over the land from Cornwall in the East to Windsor in the West. It is true that the parts of Ontario immediately around us are fertile and well cultivated, but the cultivated lands comprise only about one-seventh part of the whole Province, and form a fringe along its southern side. The remaining six-sevenths of its area, which lies further north, is as yet almost undeveloped and hardly comes into your thoughts when you are considering the Province as a whole.

New or Northern Ontario is as yet practically an unbroken and untilled wilderness, except that it has to a considerable extent been stripped of the richest portion of its natural crop, namely, of its forests of white pine. These pine forests, the natural growth of the unbroken soil, yielded many large fortunes to those who had the good judgment to secure them. Fortunes will still be made from the products of the forest; but in our northern country the forest growth is very slow, so that when the land is found capable of being used for other purposes the forest must needs give way. For instance, we now know that in Northern Ontario, near the Height of Land, between the watersheds of the Great Lakes and Hudson's Bay, there is an area of 25,000 square miles of rich clay land, which is eminently suited to the growth of all the more hardy cereals. Judging from the similarity of the vegetation on this forest area in Northern Ontario to the vegetation in the wooded regions of Manitoba, Saskatchewan, and Alberta, where the best wheat in the world is grown, I am confidently of the opinion that this great clay belt of the north, with its 16,000,000 acres of rich land, will, when cleared and drained, be the wheat-growing region of Eastern America, and that the wheat that it will grow will be No. 1 hard. This statement, that there is within this Province, within a day's journey of us, land now lying waste which is capable of producing 150,000,000 bushels of hard wheat every year, may seem hardly credible; but such seems to me to be the case. The model farms which the Government will shortly establish in that region will prove the value of this land, and the character of the crops which can be raised to the greatest advantage, whether these crops are wheat or some other grain. This land is one of the assets of Canada, and its cultivation and use will be one of the reasons why this century will belong to Canada.

I might speak for the whole evening of the vast areas of fertile land as yet uncultivated, that lie between the western border of this Province and the Pacific Ocean, the largest areas of rich unbroken agricultural land in the world. But you have heard of that Western country very often of late, and so anything that I might say here would be tiresome and uninteresting. Only those of you who have travelled through it and have seen it can begin to comprehend its possibilities. We all, however, feel certain of the great agricultural development that is in store for Canada.

My purpose in coming before you to-night was not to dilate on Canada's agricultural greatness. Around and beyond the agricultural land are vast stretches of rocky country, which are not suited to the needs of the farmer.

*A paper read before the Canadian Institute.

Parts of this country will probably be kept for the growth of forest, for the time is at hand when trees will be grown systematically and carefully by the foresters, just as hay and grain are now grown by the farmers, and probably the cultivated forests will grow far larger crops of trees than evey grew in the natural forest. But still the development and progress of very much of Northern Canada will depend not so much on what it produces from the surface upwards, but on the valuable minerals that will be dug by miners from beneath the surface.

Now the figures quoted above indicate to some extent the value of what has already been done in the way of unlocking this great treasure house of nature and taking out the ores and metals that are so necessary to the welfare of mankind. Last year ores and metals to the value of $80,000,000 were recovered. Ten years ago the mineral production of Canada had a value of $20,000,000—a very satisfactory increase in the time.

But let us look at the record of the mining industry in the United States. In the year 1905 the mineral products of the United States had a value of $1,623,000,000, or about twenty-one times as much as the production of Canada in the following year. This gigantic figure should make us very modest in talking about our present mining enterprises, and it shows us what we must attain to if we are to claim this century as in any way belonging to us. I believe we can produce as much as the figure last stated before the close of this century, but you can see that Canada must advance with tremendous strides in the discovery and development of her mineral resources if she is to attain to any such results, and such results are quite unattainable unless the people of this country take a far more general interest in mining than they are doing at the present time.

Probably one-half of the whole of Canada is limited to minerals and ores for the production of its wealth, and consequently its national progress depends to a very large extent on the discovery and development of these sources of wealth. Such being the case, it becomes the duty of all good Canadians to take an intelligent interest in mining affairs. Possibly some of you may say that you do take a great interest in mining, that you own so many shares in such and such mining companies, and that you are much interested in the market value of your stocks. Whether the mine will ever pay back the capital invested in it, whether it is producing an adequate quantity of ore to enable it to pay good dividends on what you paid for the stock, or whether the property has to rely entirely on the verbosity and persuasive powers of the brokers to give it a value, you perhaps do not know or do not care as long as the market holds up until you have disposed of your stock at a handsome profit. Now, gentlemen, I wish to tell you that in such cases you are not acting as the friends of the mining industry at all. You are introducing into what should be considered an industrial enterprise the worst methods of the real estate agent. In many cases you are piling up on that enterprise a financial burden greater than it is able to bear, and it will sink in consequence. If you wish to be a true friend of the mining industry and—considering its vital importance to the welfare of the country—every honest-hearted Canadian must wish to be ranked among its friends, you should devote a certain reasonable amount of time to the study and investigation of the conditions under which the mining industry is carried on, by reading standard books on mining and on the modes of the occurrence of ore deposits, and by including among the magazines which you regularly glance over each week or each month one or more that treat especially of mining. No one in this city can urge the excuse that such magazines are not available, for their is here published one of the brightest and most informing mining journals on the continent, one that deals strictly with Canadian affairs, and that is full of good reliable information about the mines of Canada.

This is a matter which affects the welfare of the country, not only to-day and to-morrow, but for centuries to come, and for this century at least much of the progress will depend on the children of to-day. It is therefore your duty and the general duty of the people of Canada to see to it that the children know something of the great heritage of mineral wealth that is awaiting them, of the ways in which it is being worked, and of some of the possibilities for its future extension. For this purpose the readers in use in the public schools should be revised, and a number of articles should be included which would be descriptive of the mines and mineral industries of Canada, with brief and interesting accounts of their discoveries, growth and progress up to their present conditions. An account of the discovery of nickel at Sudbury and the growth of the nickel industry up to its present enormous prportions would make a most interesting and instructive story; and the history of Silver Islet, that little rock lving out in Lake Superior, should be made known to all the children of this Province. Accounts of many romantic incidents might be chosen from the lives of prospectors who have travelled in canoes and on foot with packs on their backs through the northern forest, in discovering the deposits of ore from which the metals, so necessary to the welfare of mankind, can be extracted. All such accounts might be made very interesting, and, at the same time, they would furnish instruction which would become part of the mental equipment of the men and women of the future.

The Canadian Mining Journal should also be placed in the schools, and the older students should be encouraged to read it, as in many cases they would take more interest in accounts of incidents that were transpiring at the present time, and which possibly their parents might be talking about at home than in matters of history. Lessons such as these would be quite as entertaining and far more instructive than most of the lessons that are now read in the schools, and the boys and girls, both old and young, would be taught to know something of the mines which have already been discovered and the mining and smelting work that is now being performed in Canada. Thus from their earliest years the children would know that mining is an integral part of the life of Canada; they would have given it a permanent place in their mental landscape, and consequently would be able to think of it more intelligently and study it more easily in after life.

In view of the enormous importance of mining in the future life and progress of the Dominion, it is certainly not too much to require that some knowledge of it should form part of the education of all our children, and the beginnings of that education can be most easily imparted through the school readers. I trust that very soon not only Ontario, but all the other Provinces of the Dominion will see to it that the children are taught something about the mines and mining possibilities of Canada, and to that end will incorporate in their school readers interesting and accurate accounts of their mines and ore deposits.

Besides educating the children in the public and high schools on some of the elementary principles of mining and of the laws that govern the occurrence of ore deposits, lectures on mining should be given to the people generally throughout the country, not so much in the

mining communities themselves as in cities and towns, for the people must necessarily spread from the towns into the wilderness, and the towns in turn will be beneficially affected by the additional trade developed as more new country is opened up or as country already settled becomes more thickly populated. In addition to such lectures, which would be mostly delivered in winter, the summer schools regularly conducted by the universities and the higher seats of learning should be open not only to those who are anxious to take advantage of them and who intend to devote their lives to the business of mining, but to all who can be induced to attend in order that as many as possible should learn something of the industry which is to be the main source of wealth of so large a part of the Dominion. In such ways as these the people might be taught something about the character of the ores that the country is producing or is likely to produce, and of the many ways in which those ores are mined and reduced to commercial products for the use of mankind, and they would consequently be able to consider more intelligently any mining schemes which might be placed before them. We would not then hear so many stories about men having found silver at Cobalt years ago and not knowing what it was; or, on the other hand, about people spending large sums of money in buying properties stated by unprincipled parties to contain mineral wealth but which have no value whatever. Ignorance of the first principles of mining makes it possible for such men to sell to the people worthless stocks in so-called mining companies and interests which they would never have bought if they had been in a position to know their value. The money that has thus been wasted in the past 12 months would more than pay for the improvements in education here suggested for the next 20 years.

I would also suggest that both the Dominion and Provincial Governments be asked to introduce and establish Information Bureaus, perhaps in connection with their Geological Surveys, from which information would be freely distributed as to the character of the different parts of the north country or routes of travel through it, the character of the rocks that might be met with in any part of the district, the significance of those rocks from a miner's standpoint and what useful minerals are to be looked for in them. Let this Bureau collect information from the geologists, engineers, surveyors and others who have travelled over and explored the country and put it in such form that it will be accessible and interesting to the general public, and particularly to persons who may wish to visit any particular locality. The Government might also make arrangements with the railroads, or possibly the railroads, if asked, would themselves agree to grant fares at very low rates to students and prospectors who might wish to visit the mining districts or to go out prospecting into any parts of the north country where ores are likely to be found, and in this way great numbers of young men who necessarily take holidays from their regular occupations for a few weeks each year might be induced to spend their holidays in searching for ore deposits somewhere up in the north country instead of hooking harmless little fish or shooting beautiful wild birds and animals. Make prospecting fashionable and popular like fishing and hunting and you will see at once a very rapid increase in the knowledge of the resources of the north country. Such fares as are here suggested are now given by the railroads to homeseekers who wish to inspect the agricultural lands in the West, and surely they might be given with more reason to men who are willing to endeavor to open up the much less inviting and rocky country of the north.

In addition to such tickets, prizes might be given to the men who would bring in the best collections of minerals each year. In this way many useful minerals might be discovered, many new localities for other minerals might be made known, and the students and prospectors would be given a very great incentive in their search for minerals and ores. To start this matter at once, I will here offer a prize of $100 for the best collection of minerals made in the Province of Ontario next summer, and the collections to be judged by the Professors of Mineralogy at Toronto and Queen's University, if they will accept the charge. The full particulars of this prize will be stated later after consultation with these professors. I trust that other men will also offer prizes, so that possibly they might be divided up for different sections of the country.

Now Mr. President, ladies and gentlemen, I wish strongly to impress upon you the fact that the mining industry must be the staple industry for very large portions both of this Province and the Dominion. The Government that holds the control of that great northern country in trust for the benefit and welfare of the people should see to it that the country is developed along the best possible lines, and for the greatest benefit of the people, both by teaching the children mining in the schools through the medium of the school readers, and the older people by popular lectures on mining and summer classes. In this way it could enlist the sympathies of the whole people and build up a sound mining sentiment.

An Information Bureau should be established which would collect and systematize the knowledge that is now stored away in Government reports and other places not easily accessible or attractive to the people and presented to the people in interesting and readable form.

The people should be induced by cheap railroad fares, prizes, etc., to visit the north country for themselves to see its mines and to spend some of their holidays in trying to find its mineral and ore deposits.

Northern Canada is part of the Dominion, and Canadians cannot get rid of the responsibility that rests on them for its proper development.

CONCERNING THE PROFESSION OF MINING ENGINEERING.

H. G. V. Adler.

The Canadian Mining Journal deserves the thanks of all interested in mining for the work it has done in exposing the fraudulent practices of certain company promoters. In connection with this movement there has been considerable discussion as to the status and reliability of many alleged mining engineers. This is not a new question. It has been considered and dealt with in most countries where mining is extensively developed.

In the United States the policy followed is that of the open door, and I am unable to speak from experience of its working. But I judge, from the position taken by my friends from that side, that it has not proved satisfactory.

In South Africa and Australia, on the other hand, the hall mark of the mining engineer is the membership of the Institute of Mining and Metallurgy, and that membership is reserved for the technical and practical man who can give the Institute proofs as to his honesty and ability, and for whom any member of the Institute will stand sponsor.

In addition to this the Governments of the Transvaal and of the Australian States safeguard the mining industry and the lives of the workmen by certificating mine managers and underground managers. No person not holding a certificate can operate a mine. This is enforced by fine or imprisonment.

In Australia there is an examining board, consisting usually of the Chief Inspector of Mines a mining inspector and a boiler or machinery inspector. This board considers applications for examination, which must be accompanied by proofs and records of mining and underground work. If satisfied with the length of experience shown, the board will examine the applicants and issue certificates to those who pass the tests.

In addition to a knowledge of the actual working of mines and familiarity with machinery commonly used, a rough knowledge of field geology and compass surveying is necessary, as well as a good working acquaintance with the mining acts and regulations.

In the Transvaal the test is much more severe. The board consists of a chairman—the State Mining Engineer—one mining inspector and one boiler inspector appointed by the Government, and one member each chosen by the Chamber of Mines and the Mine Managers' Association. Proofs of seven years' actual mining work have to be given (graduates of certain mining schools are remitted two years of this term), before the candidate is allowed to sit for examination. The examination is oral and is conceded by all those who have submitted to it to the most searching test of mining knowledge yet instituted.

I believe that if the Ontario Government will add to their Mines Act a provision for the examination and certificating of mine managers that it will result in enormons benefit to the State. I would suggest that all mines employing over 20 men be required to employ a certificated manager, and that all mines employing more than 100 men be required to have certificated underground managers as well.

Such a step will help in pointing a way to the formation of an Institute of Mining Engineers that will protect the honest and able engineer and the public from the depredations of the "Mike MacDonalds," who are always at the service of the "Laws" and "Russells."

MINERS' CLUBS.

F. W. Gray.

The Mechanics Institute movement that had such a vogue in the latter half of the Nineteenth Century has within the last two decades either spent its force or evolved along divergent lines.

The original impulse was largely educational, but in this day of cheap and good books, of magazines and periodicals in bewildering and wasteful profusion, of free libraries endowed by millionaires, of locomotion the speed and luxury of which has ceased to astonish us, the problem is not how to educate and improve our intellects, but rather how to find peace and quietness and a surcease from the eternal racket of man's noisy inventions, from the unremitting concentration of mind that modern life demands from those who work.

The debating society, which loomed so largely in our grandfather's days, has also ceased to attract, although the desire of the workingman to measure his wits against those of his fellows and to discuss in public the social problems of the day as affecting him and his, has in no wise abated. Nowadays the lodge room of the trades union society affords an outlet for the argumentative and oratorical longings that have been associated with British citizenship of all grades ever since the Witenagemote met beneath the village oak. The budding labor member finds in the activities of trades unionism abundant opportunity to sharpen those oratorical darts which he hopes someday to discharge in the legislative chamber.

For these and many other reasons the old type of workmen's club as represented by the Mechanics Institute has been gradually displaced by institutions, where the desire for amusement and the relaxation of social intercourse can be gratified, where, in a sentence, a man may cultivate cheerfulness of soul, apart from all questions and shades of politics and religion, apart from the interminable discussions of the rights of man or the world-old strife between him that hath, and him that hath not.

Among no class of workmen is the need of such institutions as pronounced as it is amongst miners. The surroundings of a mining town or camp are as a rule of the unloveliest or the rudest. The monotony of a carboniferous formation landscape is well known, and nature appears to delight in placing her treasure houses of silver and gold and precious stones deep in the mountain fastnesses or in some cheerless land of arctic cold or torrid heat. The miner loves to talk "shop" as everybody who has lived and worked with miners will testify. This tendency is to be noticed amongst the rising generation of miners, for the raw schoolboy after two days work in the mine talks "shop" as readily and as persistently as his father does. It is difficult for a person who has never worked underground to realize the absorption of the miner in his daily toil, and to realize also that underneath the surface is a network of roads and passages which the miner traverses daily, the names and "scenery" of which (if one may be allowed that term) are as well known to him as the streets and scenery of the upper world. The life and conversation of the miner therefore is underground, almost wholly detached from that of the rest of the world, and for this reason the society and institutions in which he is interested partake of the same detachment and have a tendency to become exclusive, for the true miner has a secret contempt for every trade but his own, and there is in consequence a kind of freemasonry between miners, and a strong line of demarcation between them and the rest of mankind.

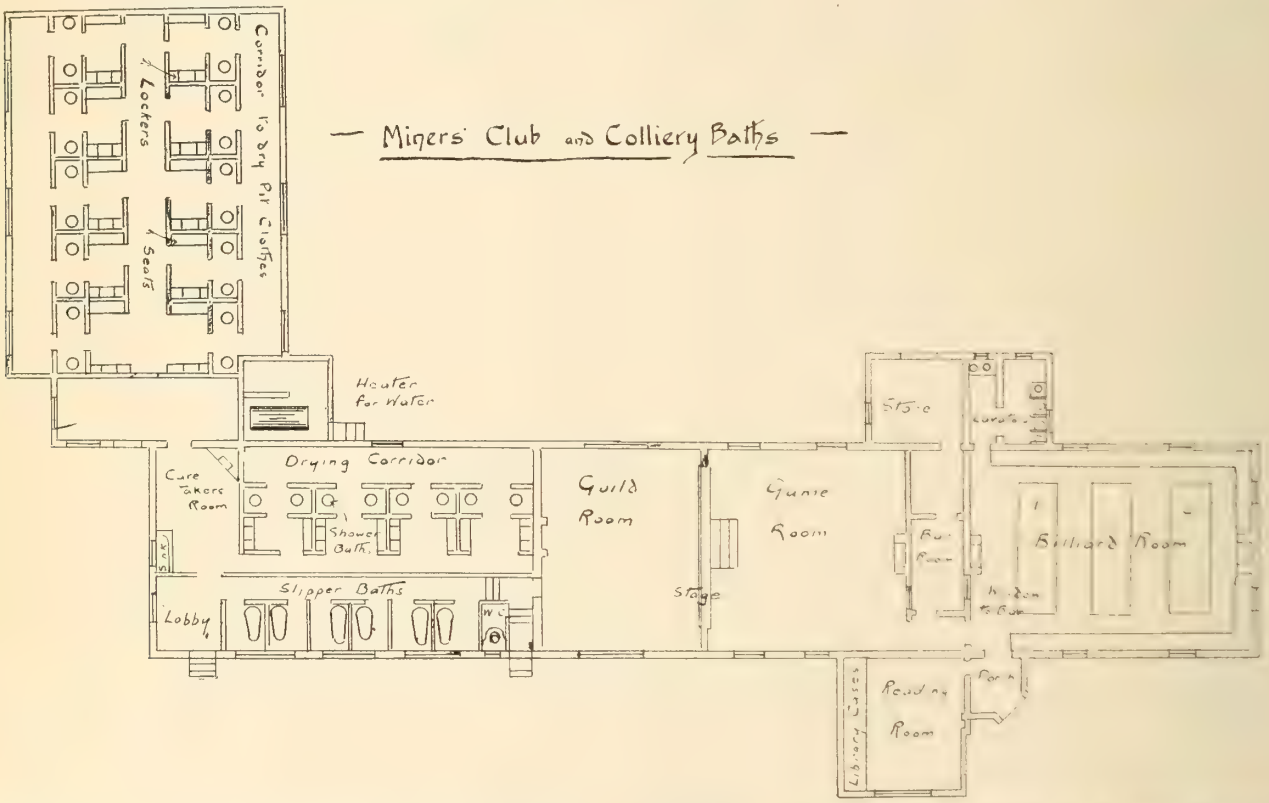
The same characteristics mark the miner in Westphalia who greets his comrade going to work with "Gluckauf!" as mark the miner in Wales or in Cape Breton. The men who descend into the depths of the earth have an individuality as strong as the men who go down to the sea in ships, and the true miner is born, not made.

In most of the colliery towns of Great Britain, Europe and in the United States a "colliery club," "reading room," "institute," or by whatever name it is distinguished, the miners' club is a centre around which a great deal of the social life of the mining community revolves, and it is rare to find a colliery in European

mining centres, at least, that has not attached to it something in the shape of a workman's club.

A typical institution of this kind is to be found at a South Yorkshire Colliery employing from 1,500 to 2,000 workmen with which the writer is familiar, and a description of which will serve as an illustration of the general run of these clubs.

A large number of the employees at the colliery referred to, reside around the pit mouth, and the club is situated in the midst of the colliery village. It is well built erection of brick and stone. It contains a large billiard room, fitted with billiard tables and having upholstered seats running the full length of the walls, to accommodate the spectators at the billiard turnaments, which frequently take place between visitors from other collieries and the home team. Another room (see ground plan accompanying) is used for games of cards, checkers, etc., the stakes being limited within certain very small sums. Between these two rooms is situated the bar, heated corridor for drying the pit clothes, and lockers are provided for pit boots, soap and towels, which the men provide themselves. When first installed the baths were looked upon as a doubtful experiment, and all kinds of dreadful things were predicted of those persons who were so venturesome as to wash their backs, there being a superstition in this district, that ablutions weaken the back. To-day a further extension is contemplated as the lockers are in great demand. It will be noticed that the arrangement of the showers gives more privacy than the great "Waschkaues" of the German collieries, of which these baths are a modest imitation. In some respects the British collier is a very backward person, and it is surprising to know that the baths we have described are the only ones of their kind in England, notwithstanding the fact that cleanliness is a necessity to the miner, and the conveniences for bathing in their own houses are generally lamentably deficient, a state of affairs, however, that is by no means confined to



where light beers and mineral waters are sold. The landlord of the colliery will not allow saloons on his property, the nearest one being at least a mile away. The amount of liquor sold is limited to a certain number of glasses to each member, and is not sold to any person under twenty years of age. This arrangement has been found to work very satisfactorily, and has kept the men at home. Between the game room and the baths (see plan) there is what is known as the guild room, which is devoted to the use of the boys working at the colliery, and this room is so arranged that it can be thrown open to the game room by folding doors, and can be then used as a stage for concerts, entertainments and illustrated lectures of various sorts. The baths are a novel feature, being the only ones of their kind oustide the Continent. As will be seen there are six slipper baths, and twenty-eight showers. As first installed there were only eight showers, the additional twenty having been put in after the others had proved financially successful. The shower baths are used by the men after work. There is a steam

England. Attached to the club is a good permanent library and a reading room, which is kept well supplied with the daily papers and periodical literature. This room is well attended and strict silence is enforced.

The club is perfectly self sustaining and pays a dividend of about 8 per cent. on its shares. The buildings are the property of the Coal Company, but the management of the club's affairs and finances is entirely in the hands of the members. The club is a member of the Working Men's Club & Institute Union, which consists of 1,120 clubs all over the British Isles.

It cannot be disguised that the chief financial support of these clubs comes from the sale of exciseable goods, chiefly beer and tobacco, and at the present moment a red hot agitation is being conducted by the clubs against certain proposals of the present Government, among which is police supervision of clubs that sell drink to their members. It is difficult to understand a certain type of temperance agitator, and it appears likely that these clubs will have to suffer for the sins of disreputable

associations for the sale of liquor outside of licensed hours, that have sheltered themselves under the guise of clubs.

In the United States prohibition in mining camps has proved a ridiculous failure, of necessity, while the restricted club has proved the best aid to sobriety that the mine owner has been able to call to his assistance. In Germany a colliery without its bierhalle or casino would be a nine days' wonder. In many English colliery villages institutions like that just described have kept whole populations sober, who would otherwise have gone afield to get drunk every week end. In Canada the writer is only acquainted with Cape Breton collieries, where they have a ridiculous enactment that prevents the sale of liquor within one mile of any mine, on paper that is, for sad to relate every payday the outputs drop down and remain down for three and four days. The only virtue of this enactment is that it gives the colliery companies power to root out an obnoxious saloon keeper if necessary. It is admitted by everybody, but the temperance crank, that a workman's club cannot be successfully run to-day unless the sale of liquors and tobacco is permitted, and as to which is the better, the restricted and properly regulated club, or the long bar behind locked doors where a man takes his liquor, pays his dollar or more, gets no change, and is straightway "paralyzed"; no one but the said crank would hesitate to say. But under existing laws the man who wishes to drink must do so in some such hole and corner way.

We think it can be safely asserted that a well managed club somewhat on the lines of the one described in this article where men can enjoy some little relaxation of mind and body after their day's work, a place not too Puritanical in its rules nor too lax on the other hand, where men can take refuge from wash-day and other domestic turmoils without the risk of getting "loaded" and losing a week's pay, is a useful adjunct to any colliery, and the subject is one that should commend itself to coal corporations and their officials.

NOTES ON COBALT ORES.

W. K. McNeil.

Owing to the complex nature of the ores of the Cobalt District, certain difficulties are encountered by the chemists who attempt their assay. A few hints on the method and apparatus employed are here noted.

The ores of this district comprise mainly, smaltite, niccolite, native silver, argentite, all associated more or less with calcite. The rarer minerals such as ruby silver, dyscrasite, etc., do not play any impartant part.

Owing therefore, to the richness of many veins the sampling of these becomes a question of the first importance; and even in the smallest assay office a power crusher should be employed. The jaw crusher has been found to do excellent work, the crushed product being very uniform, and only a small amount of fines resulting. Here may be mentioned the absolute necessity of a plate glass quartering or sampling table. By its use the smallest danger of salting is avoided. As said before the richness of the ore in many instances must put the chemist ever on his guard against this danger, as very often he unconsciously salts the sample by using screens of very poor shape. Such unfortunately are sold by many of the supply houses.

To grind the sample to a suitable mesh for assaying many use the disc grinders made of hardened steel. These may be used with impunity on ores that are low grade. But on high grade, or any grade ore, the final grinding should be done on a buck board, which can be easily cleaned. And here may be stated the necessity of having two boards, so that rich samples will not be ground on the same surface as poorer ones. Any metal surface will in time absorb silver.

The preparation and charging of the samples differ not materially from other silver bearing ore, except that scorification takes precedence; and here there is great room for research work to show the relative values of prucible and scorification assay. Taking for granted that the scorification process is used, the main point to be noticed is the fact that arsenical ores such as are found in this district will not stand roasting, as silver is lost by volatilization. Hence the charge must be so mixed and the temperature of the furnace so regulated that the roasting is entirely eliminated. Many assayers complain of the bumping of the assay during scorification. This can be overcome by having:—(1) The scorifiers thoroughly dry; they absorb moisture readily if stored in a damp place, the battersea particularly showing this defect; (2) the charge well mixed; (3) the scorifier not too deep; (4) having the furnace at the proper temperature. A small covering of litharge is here found to be advantageous.

When very accurate work is required a large number of samples should be taken. It is found to be almost an impossibility to duplicate exactly any result in a smaltite or niccolite bearing ore, and check assays should always be run to determine the error of volatilization in the furnace.

The comparative value of a litharge charge in a crucible assay was discussed in an excellent paper written by Mr. Large, and read before the American Society of Chemists which held its annual meeting in Toronto in 1907. There are still many interesting points left for original work in connection with the smaltite and niccolite ore.

An excellent standard flux, that may be used for general low grade work, consists of soda carb., borax, and argols in the proportion of 12: 8: 1. This has the advantage that it can be used as a standard and any change necessary is one of addition.

Muffle fusion for crucible work is to be preferred when a large number of samples are to be run; as the heat can be more easily regulated. In the assay of these ores the correct temperature is one of the main features to be watched.

The construction of a suitable furnace is a point that invites considerable discussion, as it seems to the writer that the present style of furnace does not meet all the requirements of the case.

The assay of nickel and cobalt is now done entirely by the electrolytic process where it is possible to extract all metal. The solution of the ore is very readily accomplished in nitric and hyrdrochloric acids, with sulphuric as an indicator. One of the main points to be observed is the difficulty in extracting all the arsenic. The solution must be reduced thoroughly and H_2S passed in for a considerable time. The writer found it advantageous to pass the gas through the solution which was at a boiling temperature, and continue until the solution cooled, and then boil the solution for some time. After filtering off the sulphide, repeat the operation, to see if any arsenic still remains unprecipitated. Another difficult matter is to prevent the cobalt and nickel being precipitated with the iron, for this several precipations

are necessary; although if the solution be thoroughly oxidized and the precipitant added slowly to the hot solution, separation is omre easily obtained. Many chemists have spoken of the difficulty in using potassium nitrite as a precipitant. This is really a matter that experience in the use of any one method must decide. It seems to be a question of the exact amount of reagents used and of the exaet temperature at which they are to be used.

In closing, the writer wishes to suggest that letters discussing the laboratory treatment of cobalt and other ores would be most beneficial to all concerned. It is hoped that the brief notes above given will open the way.

THE SIXTEENTH ANNUAL REPORT OF THE ONTARIO BUREAU OF MINES.

Deputy Minister of Mines Thos. W. Gibson, in his introductory letter states that the sixteenth report is the first to be issued since the changes in the status of the Bureau of Mines made by the Mines Act, 1906. The Bureau is now an integral part of the Department of Lands, Forests and Mines. Mr. Gibson is no longer entitled Director, but Deputy Minister. The change has no effect upon the functions of the Bureau other than that of giving it a more dignified position.

The first forty-eight pages are occupied by the Deputy Minister's statistical review. Condensed within these limits is a large amount of valuable information. Only upon a few points will space permit us to touch.

Statistical Review.—The total minerals production of the province of Ontario for the year 1906, is valued at $22,388,383. The basis of this estimate is the selling prices of the products at the mines or works. On this basis, of course, comparisons instituted between Ontario's and that of other provinces is unfair to the former.

The value of mineral production in 1905 was $17,854,-296. The following table displays the chief factors in the increased output of 1906:—

Product.	1905.	1906.	Change.
Metallic—			
Silver	$1,372,877	$3,689,286	I. $2,316,409
Nickel	3,354,934	3,839,419	I. 484,485
Copper	688,993	960813	I. 271,820
Lead	9,000	93,500	I. 84,500
Iron ore	227,909	301,032	I. 73,123
Pig iron	3,909,527	4,554,247	I. 644,720
Non-metallic—			
Brick, common	1,937,500	2,157,000	I. 219,500
Brick, pressed	234,000	337,765	I. 103,795
Cement, Portland	1,783,451	2,381,014	I. 597,563
Corundum	152,404	262,448	I. 109,984
Natural gas	316,476	533,446	I. 216,970
Petroleum	898,545	761,546	D. 136,999

Adopting the system of valuation in vogue in British Columbia, Ontario's total 1906 mineral production attains a value of $33,905,574.

As compared with 1902, the figures for 1906 show an increase of 67 per cent.

Gold.—The output of gold has declined steadily since 1902. During 1906, 3,926 ounces were produced valued at $66.193; the St. Anthony Reef, Laurentian, Sultana, Shakespeare, Olympia, Rush Bay, Golden Horn and Craig mines being responsible for nearly all of this, 11,791 tons of ore were crushed, being an average gold tenor of $5.60. It is somewhat discouraging to note that wages paid amounted to $152,011.

Silver.—Under this section appears a short sketch of Cobalt's beginning and subsequent history. It is noted that Cobalt yielded 5,401,766 ounces in 1906. Outside of the Cobalt region silver was produced at the West End Silver Mountain mine, west of Port Arthur, operated by the Hanson Consolidated Mining & Smelting Company, and from the Bessemer mattes refined for the Canadian Copper Company.

A description of the Provincial silver mine, owned and operated by the Province of Ontario, is included here. This is a unique enterprise so far as North America is concerned. The mine is situated within an area or 100 square miles, known as the Gillies Limit, lying on both side of the Montreal River and penetrating the township of Coleman with its northern apex. This land was reserved by the Government when the Cobalt excitement was at its height. The Legislature approved of the proposal to prospect and work the mineralized section of the Limit. The necessary funds were granted and work was begun in the spring of 1906, under the supervision of Professor Miller, the Provincial Geologist. A heavy over-burden of soil made prospecting difficult. To encourage systematic search, a bonus of $150 per inch of width for the discovery of rich silver-bearing veins was offered. On July 19, 1906, a seven-inch vein of smaltite, niccolite, and native silver was discovered by Messrs. T. Brown and G. R. McLaren, two mining students. Between them was divided the amount of $1,050. The native silver occurrred in sheets, nuggets, and small particles disseminated throughout the vein.

A shaft, sunk 10 feet from the vein, is down 120 feet. At 75 feet a cross-cut was run to the vein. Drifting northeast to the extent of 110 feet and southwest 75 feet is reported. The vein continues rich and of constant width so far as worked.

A suitable shaft house, an ore house, a power house, office, bunk house, dining room and blacksmith shop have been built. Two No. 42 Rand drills and two 2 3-4-inch Mac drills are operated by the high pressure half of a B-3 Rand compressor capable of delivering 450 cubic feet of air per minute. One 7 by 10-inch double cylinder Jenckes hoist, a duplex Worthington pump and a Cameron sinking pump are included in the equipment. In the power house is a 100-h. p. Jenckes return tubular boiler. A spur line of the T. & N. O. Railway, from Cobalt, to Kerr Lake, will pass close to the Provincial mine. The future working of this mine will be watched with intense interest.

Value of Ore.—The average value of ore shipped during 1904, 1905 and 1906 was $704 per ton. In 1904 the ore averaged $862. During 1905 much low-grade stuff was shipped and the average fell to $687 per ton. But the year 1906 saw the average jump up to $705 per ton. Although much of the ore in 1906 was second or third class, still there were many carlods of exceptionally

high silver tenor. The minimum limit of profitable shipping is approximately 100 ounces of silver per ton. It is probable that the numerous concentration plants now in operation or nearing completion will have the effect of cutting out low-grade shipments almost entirely.

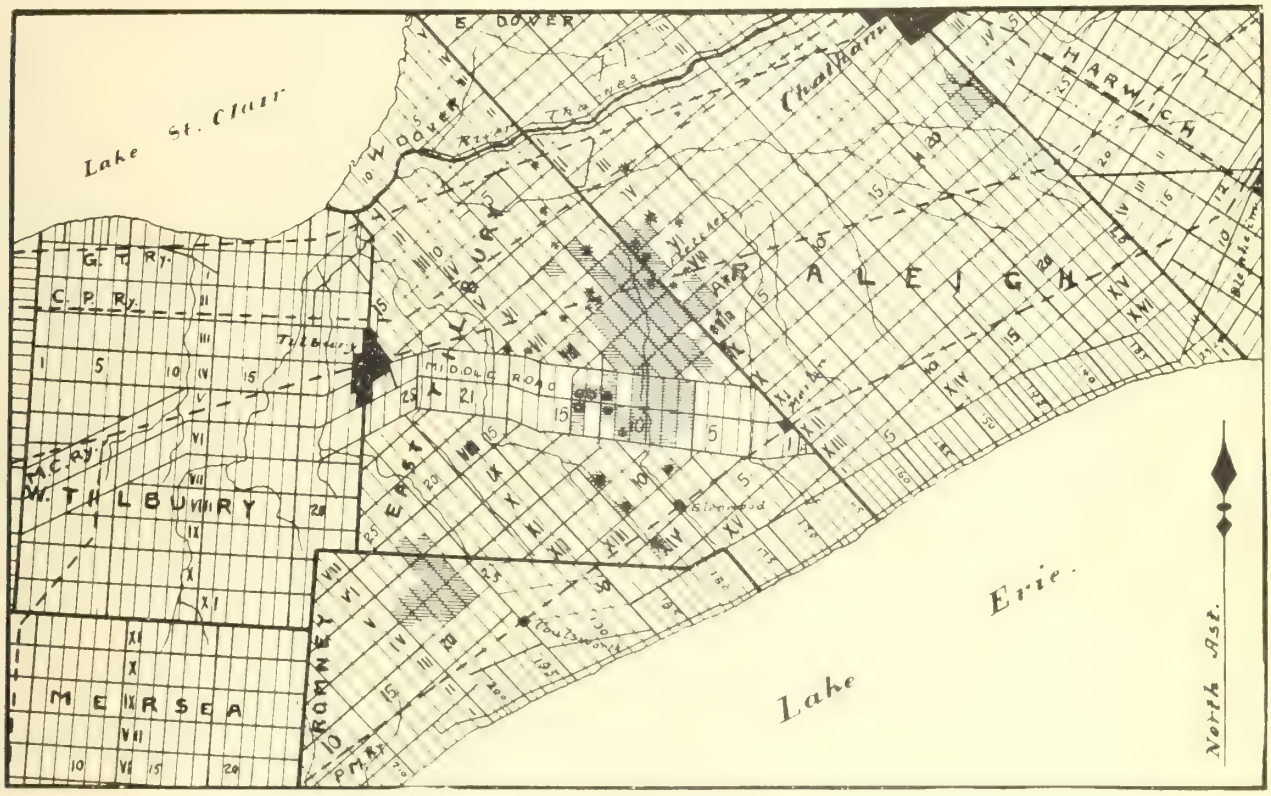
Excepting the element cobalt, silver is the only constituent of the ores that is of value to the shippers. In silver-bearing ores cobalt is paid for if in excess of 6 per cent.; in non-silver ores, cobalt is paid for at the rate of 60 cents per pound if present to the extent of over 16 per cent, lower percentages are paid for at almost the same rate. British manufacturers of cobalt oxide are the principal consumers. They advance 75 per cent. of the value upon shipment and settle for the balance on umpire assay in Great Britain.

From a tabular statement of dividends paid, up to 30th June, 1907, we gather these facts:—

A total of $1,805,938 was paid in bonuses and dividends up to December 31st, 1906. During the first half of 1907 the corresponding amount was $917,741.40.

Nipissing paid $950,000 up to the end of 1906, and $400,000 during the first 6 months of 1907. T. & H. B. paid $746,120 during 1906; Coniagas $200,000 in the former half of 1907; Cobalt Silver Queen, $120,000 in the same period. Other mines with less amounts to their credit are: Buffalo, Foster, McKinley-Darragh, Right of way and Trethewey.

Adding to the total amount given above, the returns of what are practicaly close corporations, such as La Rose, Kerr Lake, Drummond and O'Brien, the net



Plan showing East Tilbury and Romney Oil and Gas Fields, Kent County, Ontario.

Shaded Parts—Approximate oil and gas area. ◆—Gas wells. '—Dry holes.

The principal purchasers of the ore produced in Cobalt are:—

The American Smelting & Refining Company, Perth Amboy, N.J.

The Balbach Smelting & Refining Company, Newark, N.J.

The Orford Copper Company, Copper Cliff, Ont.

The Anglo—French Nickel Sydicate, Swansea, Wales.

The last named company purchases only silver-free cobalt ores.

To the above list may be added the Deloro Mining & Reduction Company, Limited, whose plant at Deloro is now in full working. The Kirkpatrick-Kirkegaard process is being used there.

Dividend-paying Mines.—The remarkable case of the Temiscaming & Hudson Bay Mining Company, which on a paid up capital of $8,110, has paid in dividends 92 times that amount, is mentioned. Most of these dividend payments were from the proceeds of the sale of the Silver Queen.

total returns up to June 30th, 1907, will approximate to four millions of dollars.

Mining Revenue.—Hurrying over the returns for copper, nickel, iron-ore, salt, petroleum, etc., etc., we notice under the heading "Mining Revenue" that the gross receipts of the Mines Department in 1906, stand thus:—

Sales	$118,244
Leases	46,621
Miner's Licenses and Fees	70,256
Royalties	15,000
Total	$250,121

It is noted, while the law of 1891 required the expenditure of a certain amount of money per acre within a given time by the lessee of mining lands, the law of 1906 requires the applicant, after staking and recording his claim to perform 240 days work upon it. Prospectors also are required to hold a miner's license, renewable annually on or before March 31st. Many companies

must hold a miner's license, the fee for which is proportionate to the amount of capital stock.

The item of "Royalties" will be many times larger during 1907.

Mining Companies.—263 mining companies were organized, during 1906, under the laws of Ontario. Their total capitalization was $184,677,000. 18 companies of foreign incorporation were licensed to do business in Ontario. Their united capital was $12,536,000.

Diamond Drills.—Of the diamond drills, owned by the Province and rented out to prospectors, note is made of only one—the Sullivan "S" drill. One hole 123 feet deep, sunk in diabase, was put down at a cost of $598.96, or $4.87 per foot. The gross cost of diamonds was $210.80, or $1.71 per foot. The Department stands 35 per cent. of the total cost. Other figures of drilling costs are $11.91 gross cost per foot through conglomerate, and loose and broken ground.

Accidents.—Two men more were killed in 1906 than in 1905. Eleven were killed, eleven slightly injured, five seriously injured. Five of the men killed received their injuries above ground, six below ground. Dynamite was responsible for the death of but one man. This is cause for congratulation. The Department has taken pains to disseminate information on the use and care of dynamite. We take it that the fact that but one man was killed from this cause was largely due to the interest taken in the matter by the Government. When one considers the larger activities of 1906, as compared with previous years, the record is all the more satisfactory.

Mining Divisions.—The year 1906 was marked by the extension of the principle of decentralization in the administration of the various mining Divisions. The aim of the Department was to place a competent officer wherever necessary, who would, as far as possible, deal with applications for mineral lands without reference to headquarters.

Provincial Assay Office.—At the Belleville Laboratory, 1,838 ore samples were tested quantitatively during 1906 for one or more elements. 191 were examined qualitatively. Much special work was done for the Bureau of Mines. For the public a large number of assays, analyses, identification, etc., were made. Information concerning the value of minerals and the market was supplied to many owners. Umpire assays and analyses were also done. Mr. A. G. Burrows, M.A., B. Sc., Provincial Assayer, reports altogether a most successful year.

Summer Mining Classes.—This educational enterprise, recently the subject of warm commendation from an English journalist, has for some years been in the of Dr. W. L. Goodwin, Director of the School of Mining, Kingston, Ont.

Dr. Goodwin, who was assisted for a time by Mr. J. Watson Bain and later by R. Y. Fitzpatrick, confined his attention largely to the Temiskaming district. 30,000 mineral specimens were distributed to prospectors, of whom 930 attended classes. Dr. Miller's "Minerals and How they Occur" was largely used by many of the men as a basis upon which to work. Classes were held in Latchford, Cobalt, Haileybury, New Liskeard, Tomstown, Giroux Lake, Boston and intermediate points.

The importance of this peripatetic summer school is recognized more by outsiders than by Ontarians. It is one of the outstanding educational features of the Province. Much more of it is needed. Although it is impossible to estimate the benefits resulting from this instruction, it may confidently be stated that Ontario's mineral output would have been much less than it is today had these summer classes not existed. The idea is a good and practical one. It is yet in the germinal stage and could most profitably be expanded. Dr. Goodwin's brief report is by no means the least important section of the volume.

Mines of Ontario..—The comprehensive report of Inspector E. T. Corkhill, on the mines of Ontario can be noteicd but briefly. It will be the subject of extended attention in a later number of the CANADIAN MINING JOURNAL.

Mr. Corkhill mentions the small amount of development work done at Larder Lake and the impossibillty of forecasting the future of that camp. Sturgeon Lake and the Upper Manitou region were the scenes of the principal activity in gold. The Abitibi country also came in for attention.

Refering to the erection of expensive plants on improved properities Mr. Corkhill writes thus:—"This has been Ontario's great drawback, namely, the installing of expensive machinery before the ore bodies have been tested, and it is to be hoped that the majority of the companies will prove up their ground before going to the expense of erecting costly works on the surface.

The Inspector alludes to the activity in prospecting for iron ore; to the development of copper properties during the last two years, especially along the north shore of Lake Huron; and to the need of strict observance of the regulations of the Mines Act, regarding the handling of dynamite.

Oil and Gas in Kent.—Mr.Corkhill's report is followed by a paper on oil and gas in Kent, written by Mr. C. W. Knight, Assistant Provincial Geologist. This excellent monograph demands all the space that can be spared. It is carefully written, is simple and direct in style and diction and presents some new and interesting facts.

The Kent fields, Tilbury and Romney, are named after the townships in which they occur, and lie between Lake St. Clair on the northwest and Lake Erie on the southeast.

(To be Continued.)

"RARE SPECIMENS"—OF IGNORANCE.

We take the following *verb. at lit* from the *Toronto World*, as published under Cobalt date, November 22nd:

"They have also a vein of iron pyrites, carrying $7 in nickel, $3 in silver, and the quartz carrys $4 to $5 a ton in gold. A large calcite vein which has been traced for about 2 miles varying in width from 10 to 25 feet, one of the rare irons have been found in this calcite, namely calum balite, or tantalite on the same vein, directly north. A claim owned by Maneaux and Daly assayed $105 in galena and $6.95 in silver. This claim is under option for $55,000."

Considering that galena is a sulphide of lead and that lead is worth 4.75 cents per pound, or $95 per ton, the contents of this rock, irrespective of silver values, are conclusively exceptional. And as "a claim" is represented as assaying this the silver by-product is an Ossa piled upon a Pelion of profit. Then again, the existence of "calum balite"—the "rare tantalite"—is a discovery meriting the award of the Nobel prize for assininity to the writer, if not the editor, who published the fact. If Wendigo Lake is at all buoyant on the strength of such reports its residents should give their authors the iced bath treatment. Nor should the lay journalists of Toronto be exempt.

ALEX. GRAY.

THE LARDER LAKE DISTRICT.*

R. W. Brock.

Note.—This report is based on field work which occupied about two weeks' time. The rocks have not yet been subjected to microscopical or laboratory examination. Consequently, the report must be considered tentative and subject to revision.—R.W.B.

Situation and Means of Access.

Larder Lake lies about 34 miles north of the head of Lake Temiskaming, two and a half to three and a half miles west of the inter-Provincial Boundary Line between Ontario and Quebec, and a few miles south of the height of land separating the Ottawa and St. Lawrence waters from those flowing northward to James Bay. The location of the corner posts of the townships of McGarry, McFadden, Hearst and McVittie would fall in the main body of the lake near the north shore, so that the northeast arm lies in McGarry, the southwest in McFadden and most of the western part of the lake in Hearst.

Access to the lake may be had by several routes. Those most frequently followed are via Tomstown, on the Blanche River, which may be reached from Haileybury and New Liskeard either by steamer up the Blanche River, a twice-a-day service, or by two and three-quarter miles by waggon road from Tomstown.

From Tomstown a canoe route or a waggon road may be taken. The river from Tomstown to Wendigo Lake on the east or Abitibi branch of the Blanche is swift, and three portages are necessary, the last one being a mile and a half long, so that the best part of a day is taken in covering this distance. As it is only about seven miles by wagon road to Wendigo, this is usually made the starting point for the canoe journey. This canoe route leads northwestward through the Wendigo Lakes and a connected chain of eight small lakes to Raven Lake, across the south end of Raven Lake to Larder creek and up the creek to Larder Lake. This route can be easily followed and the portages are short and light. The only portages of any length are the one into Raven Lake and the one from Raven Lake, round the falls of Larder creek. These two are each about one-third of a mile long. The trip from Wendigo to Larder can be made in a day, and at present this forms the best summer route for travellers and supplies.

There is also a wagon road from Wendigo to Larder Lake. A little byond the half-way house this road forks, the west branch followed by the telephone line running to Spoon's Bay, and the east branch connecting with Fitzpatrick's Bay, about sixteen or seventeen miles from Wendigo.

While a good route in winter, and not too difficult for foot passengers at any time, the wagon road is next to impassable for horses at the Larder Lake end except during the winter season. A trail runs from Boston on the Temiskaming and Northern Ontario Railway to Larder Lake city, a distance of about twenty miles. A good wagon road is now under construction by the Government between these two points, which when completed will afford the readiest means of transportation into Larder Lake.

The first exploration of Larder Lake was by Prof. W. G. Miller, now Provincial Geologist, who in 1901 made a reconnaissance survey of the Blanche River, in search of iron ore formations. He ascended the Abitibi branch and crossed Larder Lake or Present Lake, as it was then called. In his report, published in the Report of the Bureau of Mines, 1902, he called the attention of prospectors to the mineral possibilities of the region.

In 1904, after the discoveries at Cobalt, W. A. Parks made a geological survey of this portion of the country for the Geological Survey of Canada. His report was published in the Summary Report of the Geological Survey for 1904. The main object of this survey was the deliminitation, north of Lake Temiskaming, of the rock formation which at Cobalt had been proved to be silver bearing. He notes the discovery of gold during the summer, along the chain of lakes between Wendigo and Raven Lakes, and expresses the opinion that this region is worth prospecting for gold.

Discovery of Gold.

During the summer of 1906, the great demand for mining property in Northern Ontario, created by the Cobalt boom, caused prospectors to extend their operations far beyond the limits of the Cobalt field, and a number of parties found their way into Larder Lake. It is said that gold has long been known to occur at Larder Lake by an Indian, Tonene, in whose hunting ground the lake lies, and that when prospectors began to approach his territory he located the first claim, thereby attracting their attention to this as a gold district. The writer has not verified this story. Before the end of the season a number of prospectors had staked claims on the lake which furnished specimens of free gold. The samples which they brought down at the end of the season caused a winter stampede to Larder Lake, and practically all the ground in its vicinity and for some miles north was speedily staked. Something like four thousand claims were recorded. Necessarily a large number of them were snows-stakings of doubtful value. Companies were formed during the winter, to prospect and develop Larder Lake claims, but only a portion of the necessary supplies reached Larder Lake before the break up of the winter road, and since then it has been impossible to get them in so that little development work that would prove the value of a property has been done or may be done this season.

Topography.

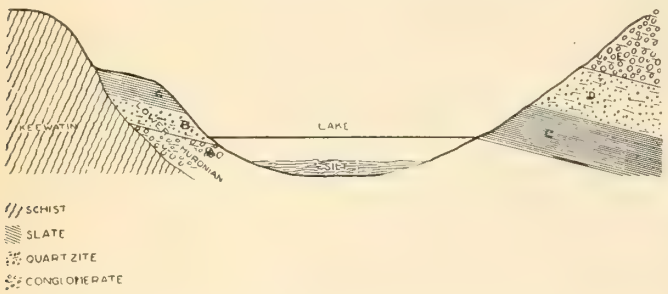
The country about Larder Lake is on the whole of low relief, having the typical glaciated form of the Laurentian peneplain. Its surface is uneven, being broken by depressions occupied by lakes and muskegs, by knolls of sand or gravel, and by protruding knees or elbows of rocks. The skyline, viewed from the higher hills, is very regular and even, but is occasionally notched by a valley or by a monadnock hill of more resistant rock. Along the southeast and east of the lake, a range of hills rising 500 or 600 feet above the lake, separate Raven Lake valley from that of Larder Lake. At the north end of this range, cut off from it by a pass, is an isolated, mesa-like hill, call Shiminis.[2] This hill has an elevation of about 750 feet above Larder Lake, and is about three miles from the head of the northeast arm. It forms the most striking object in the topography of this region.

The lake in many respects resembles Temagami on a small scale, with its arms and numerous islands. As a rule the shores are rocky, often steep, and in a few places rise abruptly as cliffs. High cliff faces, both round the lake and on the hills away from the lake, are almost invariably formed by vertical joint planes in the

Sixteenth Annual Report of the Ontario Bureau of Mines.

conglomerate formation, which will usually be found on the higher elevations. The average of barometer readings for June gives an elevation of about 1,100 feet for the lake. The shores reach an extreme height, at the head of Fitzpatrick's Bay, of 200 feet above the lake. The depth of the basin occupied by the lake could not be determined, as there was no means of estimating the extent to which it had been filled with silt. The deepest sounding obtained was in the narrows where the depth was 94 feet.

The rocks of the district present considerable variety. While a good deal of the territory is covered with drift—and contacts between the various rocks are particularly



Ideal section showing relationship of rocks on Northwest Arm of Larder Lake.

liable to be covered with this recent, unconsolidated material—the relationship between the chief groups of rocks may be determined with considerable certainty. An inspection of their general characteristics, without consideration of the relationships exhibited leads naturally to a subdivision of the rocks into several formations. A similar subdivision into the same groups is arrived at by classsifying them according to their relationship to one another.

West and north of the lake is a complex, consisting of phyllites, schists, cherts, ferruginous dolomites and greenstones, cut by igneous rocks. These rocks as a rule are lying on edge and are characterized by the disturbances and metamorphism to which they have been subjected. Cutting them at various points about the lake are pegmatite and quartz porphyry dikes, evidently connected with a granite intrusion. From the number of granite boulders scattered over the surface, it is evident that not very far away the granite is exposed. While later than the rocks of the complex, the rocks of the granite family are undoubtedly older than the sedimentary rocks mentioned below as overlying the old complex, since these sedimentaries contain fragments of the granites.

Lying unconformably upon the preceding complex is a series of sedimentary rocks consisting of slates, quartzites and conglomerates. These are for the most part undisturbed, with gentle dips, except in the immediate vicinity of a later igneous intrusion, where they may show considerable local metamorphism. In such cases differentiation from the earlier complex may be somewhat difficult, but the undisturbed condition of these rocks affords the readiest criteron for their recognition. This series is exposed on most of the islands of the main body of the lake, on the north shore near the narrows, and on the east shore of the lake.

Later than and intrusive in the rocks above mentioned, is an igneous rock which in places presents a gabbro facies, and in others a diabase, and also a series of usually small, basic, mica dikes.

The rocks of the basal complex correspond perfectly, in position and in lithological character, in their disturbed and metamorphosed condition, to the oldest formation in the Lake Superior and Lake Huron districts, which the International Committee on Geological Nomenclature recommended should be called Keewatin. The rocks of the granite family correspond to the Laurentian as defined by this Committee, and the sedimentary series to the Lower Huronian. As no rocks newer than the diabase or gabbro were seen, it can be classified only as Post-lower Huronian.

Above the solid formations are glacial and post-glacial deposits of clay, sand and gravel. There are, then, in descending order the following formations:—

Name	Rocks.
Post-Glacical	Clays, sands, gravels.
Glacial	Boulder clay.
	Great Unconformity.
Post-Lower Huronian	Diabase, gabbro, mica lamprophyres.
	Igneous Unconformity.
Lower Huronian	Conglomerate, quartzite, slate.
	Unconformity.
Laurentian	Granite, pegmatite, prophyry.
	Igneous Uconformity.
Keewatin	Greenstone, lime, silicate rocks, schists, dolomites, cherts, etc.

It will be noted that the rocks here bear a strong resemblance to those at Cobalt, the chief difference being that none of the upper members of the Huronian are represented, but on the other hand the Keewatin contains a more varied assemblage of rocks.

It is interesting to find at such widely separated points as Lake Superior, Lake Huron, Cobalt, and the



Keewatin "Greenstone," which may represent altered limestone. The dark portions are green lime-silicate minerals: the light are calcite.

Height of Land, the same rocks, showing the same relationship, falling into the same scheme of classification; thus confirming the idea that the rocks are grouped represent great widespread systems, separated by profound alterations of geological conditions during great time intervals.

Keewatin.

The Keewatin, as above noted, consists of a complex group of rocks of both igneous and sedimentary origin.

highly disturbed and metamorphosed. Possibly the commonest rock is a green chlorite schist, which probably represents an old, squeezed, eruptive rock. Sometimes this is thinly fissile, and sometimes rather massive. Hornblende schists are rather common. A soft grayish-weathering schist with green chlorite seams is also of frequent occurrence. These schists are often charged with pyrite in well formed cubic crystals.

Bands of soft micaceous schists, phyllites or slaty rocks, and a rusty weathering dolomite (?) are in places conspicuous members of the series. With the latter rock on Pancake creek is a thinly banded chert, like the jasper bands of the iron ore formation. A banded green and white cherty rock on the east shore of Fitzpatrick's Bay, also bears a strong resemblance to Keewatin iron ore formation, a resemblance strenthened by the folding and faulting to which it had been subjected. From the number of its boulders in the Huronian conglomerate, typical banded red jasper and magnetite iron ore must occur near here, possibly buried under the Huronian. It is exposed in the township of Boston to the west.

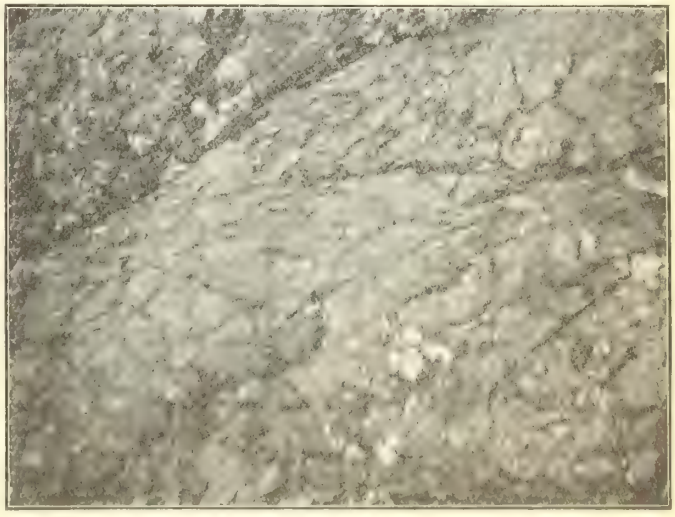
Greenstones, some highly altered, and some showing original textures, cut the older rocks of the system. These greenstones often exhibit the typical spheroidal markings, torsion cracks, quartz and calcite seams that characterize the Keewatin in the Cobalt and Lake Superior districts. On the southeast corner of Fitzpatrick's bay, near the point west of the Golden Thorn, and on Haycock hill where Brunne's trail to Boston turns west round the bend of Pancake creek, is a rock consisting of boulder-like masses of green, calcium-magnesium-iron silicate, cemented by crystalline calcite. All stages from this pseudo-conglomerate to massive green-silicate rock with seams of calcite occupying gashes like torsion cracks, are to be found. The green silicate rocks present the characteristics of typical Keewatin greenstone. Where the rock consists of boulder-like masses of silicate in calcite, it bears a strong resemblance to a limestone partially altered to green silicate rock by contact metamorphism, and the massive greenstone to the more completely altered limestone. The numerous old intrusive rocks in the Keewatin would account for the metamorphism.

While it would require more detailed work to establish the truth of this hypothesis, there are several facts which make it quite possible that some of the Keewatin "greenstones" may have had this origin, although the majority of the greenstones, without doubt are altered eruptive rocks. The Keewatin certainly contains a considerable amount of sedimentary material which must have been metamorphosed by the extraordinarily numerous intrusions of igneous rocks. Limestones or ferriferous dolomites are included in these sedimentaries, and would be expected to be altered to green silicates. This would explain the remarkable richness in lime-carbonate which some of the Keewatin "greenstone" has been shown to possess.

The Gold-bearing Rock.

The most interesting rock from an economic standpoint near Larder lake is the rusty weathering dolomite(?). About 60 per cent. of the rock consists of lime magnesia-iron carbonate, the remainder of quartz and a soft green talcose silicate, probably serpentine. The origin of the rock is as yet a little uncertain. Certain dikes, when squeezed and altered, produce a rock which bears a strong resemblance to it, but its occurrence with slates and phyllites and with the cherts—undoubted sedimentary rocks—as a conformable band with them, over a wide stretch of country, and its apparent composition, render it much more probable that it is an altered, stratified, ferriferous dolomite, probably forming a member of the Iron Ore formation. This rock, especially where cut by the porphyry or pegmatite mentioned in the Laurentian on a later page, is traversed by innumerable stringers of quartz which in places are gold-bearing. This rock was seen northeast of Reddick's at the head of the Northeast arm, extending southwest, about parallel to the arm, to about the Proprietary Company, where it gets back a short distance from the lake, past Bear and Tonene lakes, Pancake creek, Bluebell and Maxwell claims, north of Larder City and around Pancake lake. A similar band seems to occur south of Spoon's bay, and at one or two points on Fitzpatrick's bay. The Keewatin rocks are folded, contorted and faulted. They are generally on edge. That this represents the true dip, and not merely schistosity, is shown by the succession of sedimentary bands on going across the strike.

The Keewatin rocks form the oldest and most disturbed formation at present recognized. These rocks were formed during a very extended portion of geological time and under changing geological conditions. It is more than probable that this series should be subdivided into several formations, for some of the rocks are very much newer than others and have been subjected



Spheroidal markings on metamorphosed Keewatin, north shore of Larder Lake.

to much less alteration. Some disturbed and squeezed conglomerates intimately related to the Keewatin, as on the west shore of the main lake about a mile below the narrows, seem to belong to this formation, and if so mark unconformities which might be utilized to subdivide the Keewatin. The subdivision is rendered difficult, however, by the degree of metamorphism, and the disturbances through igneous intrusions.

The Keewatin is not only cut by eruptives belonging to this period, but by later intrusions as well. As will be shown below, mineralization on an extensive scale took place during Keewatin times.

A long time interval elapsed between the Keewatin and Lower Huronian during which the Keewatin was a land surface subjected to heavy erosion. This erosion produced a topography not unlike that of this country at the present day. Some of the old Keewatin valleys are now present-day valleys, as the northeast arm of Larder lake, which, as the contact between the Keewatin and Lower Huronian shows, was a valley at the close of the Keewatin. Erosion and transportation must then have great-

ly exceeded atmospheric weathering, for the Keewatin surfaces and hills were swept bare of rotted rock before the Huronian was deposited on them.

LAURENTIAN.

Included in this formation are the pre-Huronian granites, and related rocks, which are intrusive in and therefore later than the Keewatin, but which antedate the Huronian. In many places in Ontario these rocks cover large areas. Often they have been mashed to gneisses. Around Larder lake, in the areas examined by the writer, the only possible representatives of this formation are the pegmatites and quartz porphyries that cut the Keewatin more or less frequently wherever it is exposed. Erratic boulders of granite are, however, abundant, and similar boulders are held in the Huronian conglomerate, so that it is reasonably certain that pre-Huronian granite occurs in the neighborhood.

The pegmatite dikes are numerous in the Keewatin. The quartz is apt to be segregated, and to contain more or less "mineral" such as pyrite and specularite. The country rock in the neighborhood is apt to be somewhat silicified and mineralized, and occasionally gold is found, as in the Gold Hill claim. The pegmatite becomes porphyritic in places, and passes insensibly into porphyry.

The porphyries are quartz-bearing rocks with distinct phenocrysts of feldspar. Sometimes the base is reddish and sometimes gray. These porphyries are also associated with mineralization of the neighboring country rock. At the Peerless Mining Company's claims on Fitzpatrick's bay the gray porphyry is mineralized with pyrite, and occurs as fragments in a quartz vein.

The dikes of porphyry are numerous in the Keewatin.

There were extensive disturbances following the Laurentian and previous to the deposition of the Huronian, and the former rocks were eroded extensively before the formation of the latter.

REFERENCES.

[1] Reprinted from the Sixteenth Annual Report of the Ontario Bureau of Mines.

[2] See 11th Rep. Bur. Min., 1901, pp. 218, 219.

(To be continued.)

THE ECONOMIC DISTRIBUTION OF ELECTRIC POWER FROM BLAST FURNACES.

By B. H. THWAITE, Assoc. M. Inst. C.E. (London).

(*Continued from last issue.*)

Another and important argument in favor of the pooling policy is the fact that some 4,000 to 5,000 kilowatts of energy is the minimum demand of many of the most desirable of the electro-chemical and other operations, so that in a single works, without a drastic reorganization of the plant, it would be impossible to secure this output of electric energy; whereas, by the pooling of the available power from several works, this power would be obtained with little change from existing conditions. Of course the power available entirely depends upon the extent the gas engine displaces the steam engine to satisfy the internal power demands of the works.

The following table gives an impression of the power available from several works in a district, without any change of plant and operations, to secure the fullest possible economy of the water gases. The works, although in one district, are scattered:—

	Kilowatts available for external services.
District A, one furnace always available	1,490
District B, two furnaces	2,700
District C, one furnace	1,700
Total available	5,890

By the pooling system a minimum total power potential of 5,890 kilowatts is available, and this would justify the setting up of electro-chemical and electro-metallurgical apparatus.

One of the advantages of this policy of pooling is obvious: it would not only permit such an association of power production as to justify the cost of mains to central stations, but it would provide an irresistible incentive to the thorough electrification of all the iron and steel power machinery, and justify the expenditure in securing the maximum possible efficiency of the blast furnace gas.

The axiom that unity is power could not be more appropriately demonstrated than by the pooling of the power from the furnaces of several works, which, individually, would be too small to justify the establishment of a central distributing station and its associated transmission mains.

The policy of pooling furnace gases is the basis of an Act of Parliament which received the royal assent last year, and applies in an area some 400 square miles in extent, including in the area many furnaces belonging to separate firms. The full description of this pooling scheme may constitute the object of a future paper by the author, who is one of the engineers of the Parliamentary bill.

It is very likely that there are iron-making districts where it would not be necessary to incure the expense of securing Parliamentary powers for rights to lay down the electrical transmission mains, or where it would be possible to sell the whole of the pooled and available power to satisfy the demands of one electrical industry: for instance, that of producing calcium carbide (the basis of acetylene gas production), which, as the author has frequently pointed out in 1898 and since, is an ideal associate for an iron works, because the agents of production are coke, limestone, and electric energy. Again, the production of aluminium, the operating process of which is now common property, involves the production of many thousands of kilowatts of energy.

In the promotion of the Act of Parliament above referred to, the one objection met with was, that supposing the market for iron does not justify the manufacture of pig, and it became financially imperative to blow out the furnaces, what about the supply to the pooling station under these circumstances? Of course it was admitted that the profit secured from the furnace gas would reduce the risk in making the stock; but supposing it did not, what then? The author has solved this difficulty by designing a generator that, harnessed to the furnace gas cleaning plant, produces gas of more or less exactly the composition of furnace gas.

The combustible portion of a typical example of this gas is chemically constituted as follows:—

	Per cent.
Carbon monoxide	32.4
Marsh gas	0.4
Hydrogen	1.6

The cost of this apparatus is small, because the cleaning plant and associated gas mains are those installed for the furnace gas. Such a generator, of the generating capacity of the pooled gas proportion from a given furnace, would be available within three hours' notice, and the simplicity of the apparatus makes the question of depreciation during standby periods of little or no economic importance. The fluid slag from this generator can be readily converted into slag wool. This furnace type of gas generator, designed by the author, is being adopted by one of the most important of continental iron firms to compensate for the vagaries of furnace output, and is also to be used in the above-mentioned parliamentary proposition. It was illustrated on page 262 of the "Journal of the Iron and Steel Institute," 1906, No. III.

The advantages of the pooling policy will, of course, depend upon the individual circumstances of different works. The mills are probably standing some 23 per cent. of the total hours of a week, and the power waste associated with this idle week-end period will be available. Besides, the displacement of the steam rolling and other machinery by gas and electric motors will provide power all the week, and the auxiliary gas generators can be drawn upon to balance the power required for the mills.

The great change in the attitude of the Board of Trade in relation to electrical transmission schemes makes the pooling policy more economically desirable in England than it would have been when the Government department insisted that the electric mains should be placed underground, involving a heavy expenditure in wayleaves and in construction and maintenance.

The permission, under reasonable restrictions, to transmit by aerial cables means a reduction in cost of no less than one-fifth that of an underground transmission line. This means for the same expenditure on underground mains an increase of length of aerial transmission line of five times, and as with the modern experience of high-pressure transmission systems the loss of energy in transmission is comparatively of little consequence, it is obvious that the area of the field of demand for the pooled power is increased, say, directly as the square of the diameter.

To understand the progress in the efficiency and unit porportion of electrical power generation and transmission systems, the following comparison may be quoted, in which the author's original proposition of 1892, prepared in collaboration with Mr. James Swinburne, F.R.S., supported by estimates, etc., from the leading continental experts, is compared with the state of affairs to-day:—

Year of 1892—Unit power of gas engines, brake horse-power, 300; thermal efficiency, per cent., 20; electric generators, kilowatts, 1,500; pressure of transmission line, volts, 20,000; economic distance, miles, 100.

Year of 1907—Unit power of gas engines, brake horse-power, 3,000; thermal efficiency, per cent., 30; electric generators, kilowatts, 10,000; pressure of transmission line, volts, 88,000; economic distance, miles, 250.

The harnessing of the gas-engine to the blast-furnace resulted in the almost immediate increase of its unit power capacity proportions. The author was prepared to design a 2,000 indicated horse-power single unit multiple cylinder blast-furnace gas-engine in 1899.

The flywheel type of electric alternating current generators of immense capacity assisted in the gas-engine increased power-unit evolution. The foregoing tabulated improvements all point in the direction of the policy of pooling or concentration of the power output.

The irresistable incidence of this pooling policy in even a modest way will be to ultimately displace steam by gas electric power for blowing and other furnace power requirements, for driving the rolls in the mills, and for satisfying the general power requirements, because the capital expenditure of the ironmaster will be mostly confined to the provision of the electric motor. This pooling policy should eventually lead to the suppression of all preventable wastes in the use of the furnace gases.

Recapitulating the advantages of pooling, it may be said that besides facilitating the electrification of the rolling mills by the reduction in capital cost of plant, it will secure, in addition to the advantages of electrical driving, a substantial increase in the proportion of the furnace power gas, available by the suppression of the mill steam boilers. The pooling proposition will constitute an ideal combine, securing an all-round benefit to the ironmaster and the power consumer, and tend to promote the establishment of new electrical industries and thus enlarge the field of demand for power; it will financially justify expenditure in apparatus and on technical changes to secure the fullest possible economy in the use of furnace gas in the works. Of course, any available gas from associated coke oven plant, subject to certain mixing operations as will reduce the proportion of hydrocarbon in the combined gases, will be available for the pooling station. The economy resulting form the direct production of power with a rationally devised plant has been abundantly proved. A well-designed and built gas-engine, using pure and waterless furnace gas and asosciated with a high-class electrical generating machine, is claimed to be able to develop the hours of a kilowatt year for 6 6s. 8d., assuming, of course, that no charge is made for furnace gas. This economic figure of cost to an ironmaster is unapproachable by any other system of power generation, barriing water power, which is often located in such awkward, if not, almost inaccessible positions as to destroy the economic advantages of such power, per se.

As the author pointed out in 1897, few iron-making countries can benefit to the extent available to British ironmasters, because of the geographic advantages possessed by Great Britain, and because of the fact that British manufacturing industries are so well concentrated geographically as to permit electric energy to be distributed under the most advantageous conditions, assuming always that the policy of the British Government is as beneficent in its attitude to the iron and steel industry as other governments are.

COAL MINE ACCIDENTS—THIER CAUSES AND PREVENTION.

The shocking calamities that have of late occurred in West Virginia and Pennsylvania have stirred this continent profoundly. That such wholesale loss of life is preventable is demonstrable. In Europe careful Government restrictions and inspection have reduced the rate of fatalities annually. The official control of the use of explosives, both as regards quality and quantity; the introduction of improved safety lamps; the use of breathing apparatus to asist in fire-fighting and life-salvage—these are the chief factors in the prevention of accidents and in meeting accidents when they do occur.

A recently issued preliminary statistical report, published by the United States Geological Survey, proves conclusively that present conditions are inexcusably bad.

During 1906 there were 6,861 men killed or injured in the coal mines of the U. S.; the total number killed was 2,061. The total number of men killed since 1889 is 22,840. During the last six years as many fatalities have occurred as during the preceding eleven years. That is, there are almost twice as many men killed annually now as there were before 1901. The great growth of the industry is not altogether accountable for this. As shown below, the number of men killed for each 1,000 employed has increased alarmingly and almost uniformly within the last decade.

Number of Men Killed in the Coal Mines of the United States for Each 1,000 Men Employed.

1895	2.67	1901	3.24
1896	2.74	1902	2.49
1897	2.34	1903	3.14
1898	2.57	1904	3.38
1899	2.98	1905	3.53
1900	3.24	1906	3.40

Contrasting these figures with corresponding returns for European coal-producing countries, it is found that the United States occupies a most unenviable position.

Number of Men Killed for Each 1,000 Employed—Averages for Five Years.

France (1901-1905)	0.91
Belgium (1902-1906)	1.00
Great Britain (1902-1906)	1.28
Prussia (1900-1904)	2.06
United States (1902-1906)	3.39

Within the last 75 years the Belgian rate has fallen from 3.19 to 0.94 lives lost per 1,000 men employed. The rate in Great Britain has ben uniformly low since 1891. Prussia in 1891 recorded 2.89 fatalities per thousand. In 1904 the figure was 1.80. France in 1905 had the extraordinarily low figure of 0.84. The Courrieres explosion in 1906 brought up this rate materially.

The improvement in European coal mining conditions is obviously attributable to restrictive legislation and to the establishment of testing stations for the study of problems bearing upon the safety of coal miners. The extensive experiments carried on by the Belgian Government which, by the way, leads the world in these matters, have reduced the casualty rate from 3.2 per 1,000 men employed to the present figure of less than one-third of that number.

In passing it is pleasant to note that a Canadian company, the Dominion Coal Company, has established a life-saving corps and is training its employees in the uses of breathing apparatus. The articles by Mr. T. W. Gray, appearing in recent numbers of The Canadian Mining Journal, have attracted widespread attention. It is a matter of congratulation that a Nova Scotian coal mine is setting the pace in providing for rescue work in case of accident. No other coal mine on the continent is so equipped.

The causes of coal mine accidents in the United States during 1906 are thus reported:—

Cause.	Killed.	Injured.
Gas and dust explosions	228	307
Powder explosions	80	215
Falls of roof and coal	1,008	1,863
Other causes	732	2,193

Comparison with foreign coal-producing countries again is detrimental to the United States:—

Deaths from Falls of Roof and Coal per 1,000 Men Employed.

Belgium	0.40
France	0.47
Great Britain	0.64
Germany	0.92
United States	1.70

The same contrasting tendencies are again marked. The death rates from these causes are constantly discussed in Europe, and growing larger in the United States.

In Europe the use of excessive charges of explosives is prohibited by law. No such control is exercised by the United States Government. The consequences are that the disturbing and jarring effects of heavy charges weaken the walls and roofs and are directly and indirectly the principal cause of falls.

Imperfect and unsafe types of lamps and the use of bare flames are also fruitful sources of disaster. Their use causes nearly all explosions of fire-damp.

In the United States during 1906, of all the deaths in the coal mines, 11 per cent. were due to explosions of gas and dust. In this direction again, Europe is far ahead. The systematic testing of safety lamps and the thorough testing of all explosives have, for instance, so reduced the Belgian death rate from these causes that they are now but one-tenth of what they were thirty years ago.

Although natural conditions are more favorable for mining coal with minimum danger in the United States than in any other country, yet the number of men killed for each million tons of coal raised is shockingly high.

Comparative figures for 1905 and 1906 are:—

	1905.	1906.
Great Britain	4.64	4.31
France	4.17	....
Belgium	5.64	4.96
United States	5.97	5.57

Prussia alone shows a higher rate of fatalities.

It is distinctly cause for honest pride to note that Nova Scotia, Canada's principal coal-producing Province, has the lowest death rate per million tons of coal raised. For the sake of comparison we quote it:—

Nova Scotia, 1905, ... 3.96

The official pamphlet, referred to above, concludes by indicating the principal directions in which the work of investigation and control must proceed. These are, briefly:—

(1) The compulsory use of safety lamps in gaseous mines and the employment of relighting stations or of approved relighting devices.

(2) The use of permitted explosives in regulated amounted and the exercise of rigid control of the handling and storage of the same.

(3) The employment of competent certificated shotfirers.

(4) The introduction of rescue devices that will enable persons to enter mine workings immediately after a fire-damp disaster, or to combat mine fires.

(5) The equipment of all coal mines with the proper appliances provided for first aid to the injured.

(6) The provision of penalties incase of non-compliance with regulations.

WORKMEN'S COMPENSATION ACT.

F. W. Gray.

Apropos of an article that recently appeared in the Journal, the following statements may be of interest as showing the truth of the contention that the effect of the Workmen's Compensation Act, will be to kill the Friendly Societies in Great Britain. At a recent meeting of the Independent Order of Druids, the president said that the sick experience of the Society had exceeded all their expectations, but added that it was really not sickness as the result of loss of health they had to complain of, but sickness as the result of accident. The cost was 41 per cent. above actuarial tables, and had exceeded the expectancy by 44 per cent. The Society of Druids is composed almost exclusively of artisans, miners and steel-workers. The Rechabite Society is also feeling the same pinch. This is a temperance society and is composed of the more saving and religious class of workmen, but all the same the Compensation Act seems to have sapped the morality of its members. In the four years preceding the Compensation Act, £14 out of every £100 was paid in accident claims, and during the four years after the passing of the Act £28 out of every £100 was disbursed. The officers of these societies are now advocating the abolition of accident benefits. However, the truth is that under the Compensation Act as it is now drawn the occupation of friendly relief societies is gone, for under the grandmotherly legislation which is now making England the paradise of the working classes, the employer becomes general provider, friendly society and poor laws all combined in one poor individual.

A recent decision in the Merthyr (Wales) County Court has laid down the principle that where a miner is allowed free or cheap coal for household purposes, as is the case in many colliery districts, it must be reckoned in as part of his wages in adjusting claims for disablement under the Compensation Act. This decision has been appealed, and the final judgment will be one of much importance to colliery owners.

CANADIAN MINING INSTITUTE.

At the meeting of the Council of the Institute, held in Montreal on December 7th, a committee was appointed to make all necessary arrangements for a summer excursion in 1908, to include visits to the iron mines, steel works and coke ovens of Eastern Canada, including the Maritime Provinces, Quebec and Ontario. Invitations are to be issued to European engineers, especially interested in these industries.

The following new members were elected:—Thomas R. Drummond, M.E., manager Nipissing Mining Company, Cobalt, Ont.; Cosmo T. Cartwright, B.Sc., Trail, B.C.; Geo. H. Barnhardt, M.E., P.O. Box 687, Nelson, B.C.; Heinrich Ries, D.Sc., Professor of Economic Geology, Cornell University, Ithaca, N.Y.; W. E. Segsworth, M.E., 103 Bay street, Toronto; Chas. Merry, M.E., Ferguson, B.C.; F. N. Flynn, metallurgist, Cobalt, Ont.; R. R. Cormack, M.E., Le Roi No. 2, Limited, Rossland, B.C.; D. J. Browne, A.R.S.M., Le Roi No. 2, Limited, Rossland, B.C.; L. P. Silver, B.Sc., 420 St. Paul street, Montreal; W. H. Hannay, Le Roi No. 2, Limited, Rossland, B.C.; Robert H. Stewart, M.E., chief engineer, Consolidated Mining & Smelting Company of Canada, Rossland, B.C.; A. G. Hill, A.M.I.M.E., 168 Huron street, Toronto, Ont.; L. J. Lockwood, Cobalt, Ont.; L. B. Burns, 478 Front street west, Toronto, Ont.; W. A. Davidson, B.Sc., West Canadian Collieries, Limited, Blairmore, Alta.; W. R. Askwith, M.E., Haileybury, Ont.; Nicholas Richardson, M.E., general manager, North Atlantic Collieries, Port Morien, C.B.; James Hargreaves, M.E., superintendent, Reliance Mine, Taber, Alta.

Associates: Alfred Tarut, Outremont, P.Q.; N. P. Bryant, 84 St. Francois Xaxier street, Montreal.

Corresponding Members: C. B. Going, editor, "Engineering Magazine," New York; J. D. Kendall, consulting mining engineer, London, Eng.

BOOK REVIEWS

MINING, MINERAL AND GEOLOGICAL LAW. A TREATISE ON THE LAW OF THE UNITED STATES, INVOLVING GEOLOGY, MINERALOGY AND ALLIED SCIENCES, ETC., ETC. BY CHAS. H. SHAMEL, M.S., LL.B., A.M., PHD., OF THE ILLINOIS AND MICHIGAN BARS. HILL PUBLISHING COMPANY, 505 PEARL STREET, NEW YORK. PAGES, 627, 6 x 9. OVER 100 ILLUSTRATIONS. BOUND IN DURABLE BUCKRAM, WITH LEATHER LABEL. $5.00 POST-PAID.

The value of a knowledge of mining law is readily acknowledged by mine owners and operators. Litigation, as costly as it is useless, is often plunged into by mining men ignorant of the alphabet of mining laws of their country.

Very few text-books exist on the subject. The Canadian works of McPherson and Clark on "Law of Mines in Canada" and Justice Martin's "Reports of Mining Cases" are not designed as guides to the laity. Indeed, Canadians need just such a treatise on Canada's laws as Dr. Shamel has written on the mining legislation of the United States.

It will convey some conception to the reader's mind of the design and comprehensiveness of Dr. Shamel's book if we mention a few of the sources from which he has drawn his information.

Dr. Shamel's first acknowledgement is made to Professor James F. Kemp, the head of the geological department of Columbia University. Of Dr. Gratan, Professor of Paleontology at the same seat of learning, grateful mention is made by the author. Numerous other professors of metallurgy, chemistry, mineralogy, etc., are thanked for assistance. The writings of Dr. Rossiter W. Raymond, the distinguished and learned secretary of the American Institute of Mining Engineers, are also specifically mentioned.

From these and other specialists and scholars information and help have been derived. All the standard text-books Dr. Shamel called into requisition. In his preface he advises his legal brethren to read Chamberlin and Salisbury, Kemp, Graban and other technical writers, that they may thus equip themselves to expose the pseudo mining experts, who "cloak their own ignorance by a profuse flow of misused technical terms."

The principal chapters of the book deal with these title subjects:—

Geology and Allied Sciences—Definitions.
Property in Minerals.
Legal Definitions of Mineral and Ore.
Theories of Ore Formation and Classification.
Right of Extralateral Pursuit of Vein.
Public Domain and Mining Laws Applying.
Acquisition of Mining Rights.
Scientific Definitions of Veins.
Legal Definition of Vein or Lode.
Miscellaneous Uses of Geology in Law.

American (United States) writers are proverbially inaccurate in their references to Canada and things Canadian. It does not flatter us to notice in an appendix that The Canadian Mining Journal is given an incorrect address. Despite Dr. Shamel, the Journal is published in Toronto, not in Ottawa.

In conclusion, we cannot refrain from expressing our astonishment at the author's familiarity with modern mining, metallurgical and geological literature. The task of co-ordinating so vast a bulk of heterogeneous facts must have been Herculean. Its successful accomplishment implies that the author is thoroughly familiar with several exact and several speculative sciences, has a working knowledge of the professions of the mining engineer and the metallurgist and, in short, is both versatile and erudite.

RECENT CYANIDE PRACTICE. EDITED BY T. A. RICKARD. FIRST EDITION. PUBLISHED BY "THE MINING AND SCIENTIFIC PRESS," SAN FRANCISCO, 1907. PAGES, 334.

This volume is a judicious compilation of articles on cyanide practice. The writers are men of unquestioned standing. Under Mr. Rickard's careful handling "The Mining and Scientific Press" has become the battle ground of experts for the threshing out of problems in this branch of metallurgy. The utterances of Mr. Rickard himself may be taken as *ex cathedra*. He is, in the opinion of many, better qualified to speak upon all phases of cyanide practice than any other metallurgical engineer.

Hence the book before us has every claim to merit.

The range of subjects covered is a wide one. Fine grinding, filter press practice, cyanidation of concentrate, re-grinding, assay of cyanide solutions, tube mill lining, tube milling in Korea, the action of oxygen in cyanide solutions—these are but a few of the topics treated. All of the articles are reprinted from "The Mining and Scientific Press," and, in this form they constitute an excellent *vade mecum*.

While in every compilation of this sort there must of necessity be bare spots, yet because of the variety of subjects touched upon and the constant change in diction and viewpoint, "Recent Cyanide Practice" is more desirable than the average handbook. One can open the book anywhere and start reading without reference to any other section.

For instance, opening at page 296, we find an article by T. A. Rickard, entitled "Old and New Methods at Guanajuato, Mexico." As outlined here, one of the Guanajuato problems was the conveying of the tailings from the cyanide plant to the river, one mile away. This was effected by means of a cast iron sewer pipe at grades of 3 per cent. and 2 1-4 per cent. As water was a not too plentiful commodity, the tailings were fed to the waste pipe with as small an amount of water as possible. Experiments proved that at a dilution of 2.5 of water to 1 of sand the pulp would flow rapidly without clogging the pipe. Normal dilution, the condition of the pulp when leaving the concentrator tables, was found to be about 8 to 1.

Opening again at random at page 198 we read in a paper by Alfred James, reviewing progress in cyanidation during 1906, that the use of coarser screens in stamp mills, the separation of the coarse product from the slimes and the regrinding of the former was a growing tendency. African tube mill costs were reduced from 8 1-2d. per ton ground to 5 1-2d. On hard ore a duty of slightly more than 2 tons per day per horse-power appears to be an average. Tube mill practice generally has improved the extraction by amalgamation from 5 per cent. to 7 per cent. and has saved 75 per cent. of screening expense.

The book is replete with practical working results and modern instances such as the above. Naturally, it is cosmopolitan in the variety and character of the articles included.

As a handy reference book it will supplement admirably the more exhaustive standard works. It is, of course, much more up-to-date than any text-book, written by a single author, could possibly be.

The omission of certain little personalities between two authorities on cyanidation would not have detracted from the value of the book.

We notice, with a feeling of respectful unease, that Mr. Rickard has carried into practice his reforms in terminology. Completely as we may bow to the distinguished editor's judgment in these matters, it may still be allowed us to protest that "concentrate" does not fill one's mouth half as satisfactorily as does "concentrates." Similarly, "tailing" and "slime" sound quite as unfinished as they look.

EXCHANGES.

South African Mines, Commerce and Industries, in its issue of October 26th alludes to the desirability of developing Canadian trade with South Africa. Already Canada buys South Africa's minerals. Tobacco may soon be added to the list. In return, it is pointed out, Canada may sell her mining machinery to South Africa. Canada now produces the best agricultural machinery in the world.

The *Iron and Coal Trades Review*, December 6th, discusses lucidly and forcefully the outlook in Germany. "A great many of the enterprises there [Germany], while profitable enough, are of quite recent origin, and there has been no time to form reserves. The majority are financed by the banks, which in a crisis would probably become anxious and call their money in, with disastrous results to the borrowers. In fact, the great business fabric, which the Germans have raised with so much perseverance, ability and courage, is based to what many economists consider a dangerous extent upon credit, and if that credit should be seriously disturbed disaster

Writing of the Monangah disaster, the *Mining World* refers to the laxness of the larger coal mines of West Virginia in carrying out the letter of the laws for the prevention of accidents. In August last the new mining law went into effect in West Virginia. By its provisions safety lamps must be used in gaseous mines; powder must be carried in five pound canisters; solid shooting may be done only as directed by the Inspection Department; doors must be avoided in gaseous places; and not over 60 persons are allowed in any one split.

The *Colliery Guardian,* December 6th, alludes editorially to safety lamp relighters. The necessity of minimizing loss of time in relighting is emphasized. Lamps burning mineral oil are especially liable to become extinguished in a strong current. There are strong objections to the use of either fulminate or yellow phosphorus as a relighter. Particles of the former may penetrate their way through even a double gauze and cause an explosion; while the viscous phosphorus, by coating the glass, causes a loss of light. The subject is a most important one and is engaging the attention of Continental and English experts.
might easily follow. In this respect, therefore, we have an important advantage over Germany, while our national finances are in a much better position, the necessaries of life are cheaper, and altogether we have much less to fear from a reaction in trade or stringency in the money market."

In an editorial entitled "Treatment of Silicious Ores," the *Mining and Scientific Press* points out that the problem of treating high grade silicious ores will solve itself. "In every camp the growth of mining and the development of individual mines leads to a lowering of the assay value of the average output. Cripple Creek and Kalgoorlie, the two great gold fields of the last decade, were high grade camps during their early years. Cripple Creek shipped its rich silicious material to the Denver and Pueblo smelters, while at Kalgoorlie the mills extracted the gold at a cost not a bit less than the usual smelter rate. In the course of time some of the high grade ore bodies were exhausted, and the output became less rich, per ton, simply because a general cheapening of operations enabled the managers to exploit ore bodies formerly unprofitable, and to mix the poorer stuff with what remained of the bonanzas. As much profit was made on medium grade ores as was made in the early stages of mining from the high grade product. At Goldfield the bonanzas yet remain, in large part, but steady improvement in methods of mining and milling will gradually eliminate the smelter problem. Cyanidation on the spot will follow in the wake of smelting at a distance. History repeats itself."

An article entitled "Mining in Norway" appears in the *Mining Journal* (London) November 30th. The writer is Joseph Ralph. Among other companies operating in the north of Norway is a Norwegian-American company. Their property, the Varanis copper mine, has been but recently opened. The ore carries 5 per cent. of copper. Concentration is effected by the Elmore vacuum system. Referring to Norway's reactionary legislation of 1906, Mr. Ralph states that, although Norway merely intended to prevent charter mongers from securing a monopoly of her water powers, the law passed by the Norting is a barrier to all foreign investors. No foreign mining company can secure a mining concession in Norway unless its operations are governed by a board sitting in Norway and controlled by Norwegians. Under the contract system of mining in Norway the miner, for the first fortnight, may be discharged without notice. After this period he is entitled to fourteen day's notice and can claim his wages for that length of time, no matter how little work he has done, so long as he has not positively refused to work. A striking feature of the Norwegian mining law is that, on the complaint of any discharged miner, as regards the safeness or unsafeness of working conditions, the Government inspectors will visit a mine and examine it. This is the cause of very grave abuses.

PERSONAL AND GENERAL

Mr. A. C. Garde, of Nelson, B.C., has been appointed manager of the La Plata Mines, Limited, in that neighborhood.

Mr. R. G. Drinnan, of Fernie, B.C., has been appointed general superintendent of the Pacific Coal Company at Hosmer.

Mr. L. Rameau, a French engineer, has been appointed manager of the West Canadian Collieries, Limited, at Blairmore, Alta.

Mr. C. P. Nash, of St. Paul, Minn., recently visited Vernon, B.C., on business in connection with the rehabilitation the Cherry Creek Mining Company.

Mr. A. I. Goodell, formerly manager of the Northport smelter, Wash., has been appointed manager of the Sullivan Company's lead smelte rat Marysville, B.C.

Mr. G. F. MacNaughton, formerly manager of the Fifteen Mile, Blue Nose, Cochrane Hill and other Nova Scotian gold mines, has accepted the position of manager of the Trethewey mine, Cobalt.

Mr. J. C. Haas, a well-known mining engineer of Spokane, Wash., has been retained by a Philadelphian syndicate to examine and report on a group of copper claims an Lynn Creek, near Vancouver.

Mr. O. E. S. Whiteside has resigned the managership of the West Canadian Collieries, Limited, at Blairmore, Alta., to accept the general managership of the International Coal Company, at Coleman.

Mr. H. H. Claudet, of Rossland, has been visiting Golden, where he is directing the installation of an Elmore vacuum oil plant, having a daily capacity of forty tons, at the Giant mine. It is expected that the plant will be completed and in operation within two months' time.

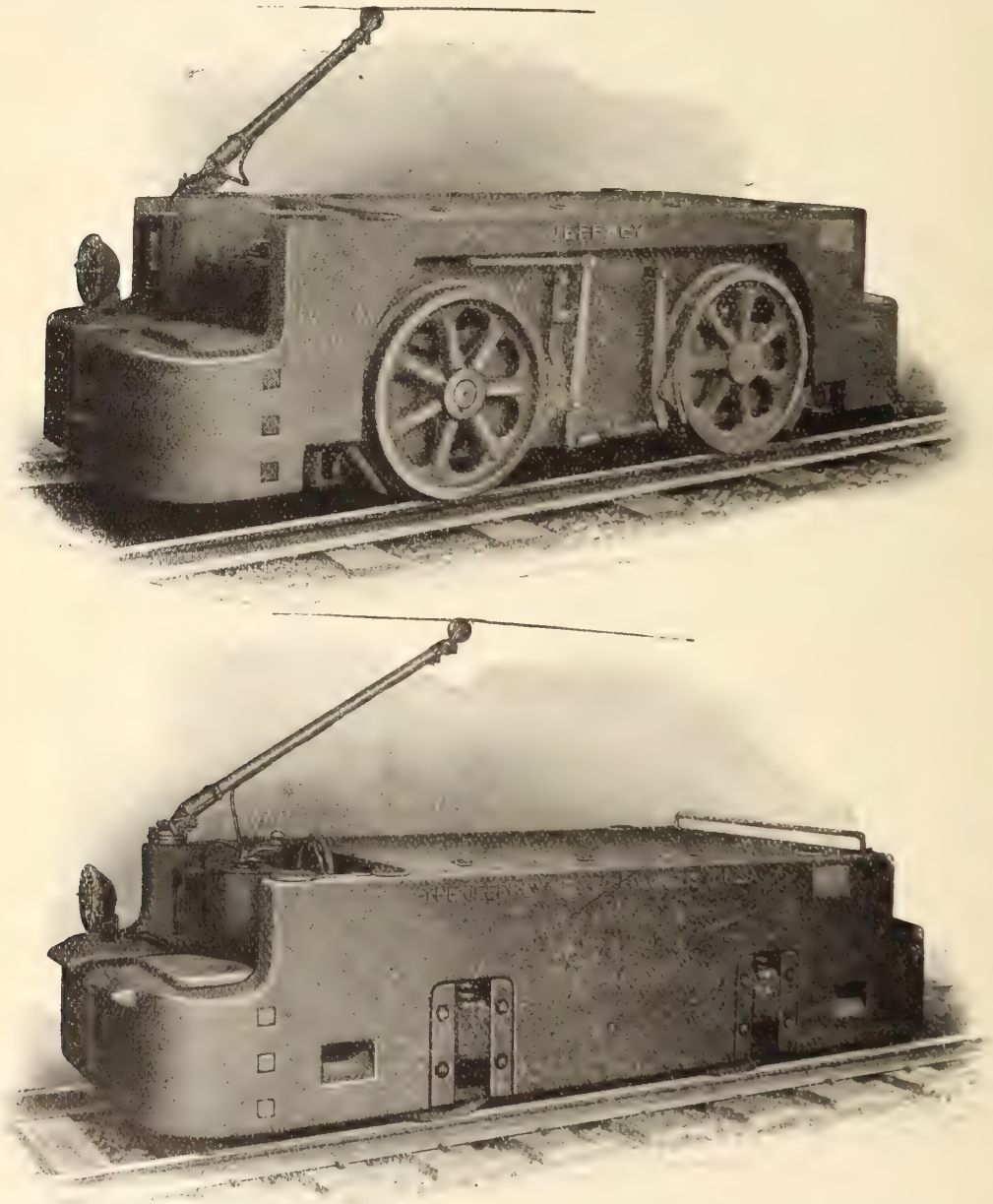
At Whithorse last month Capt. John Irving, who has identified himself with mining in that section, was tendered a complimentary dinner by the residents of the town, "in appreciation of his unceasing efforts to make of this district one of the most promising mining camps of the great Northwest."

Mr. A. N. Galer, who recently retired from the general managership of the International Coal Company, operating at Coleman, Alta., was banqueted by the staff at Nelson last week, and presented with a testimonial in mark of appreciation and esteem on the part of his subordinates.

It is stated that appeal will be taken to the Privy Council of the now celebrated mining suit of the Star M. & M. Company vs. the Byron White Company, to determine the ownership of veins of high grade ore encountered in the development of the Rabbit's Paw claim in the Sandon district, B.C. The case hinges on the defendant's privileges under the old law of extralateral rights.

A circular issued by Mr. C. E. Rhodes, president of the Institution of Mining Engineers, Newcastle-upon-Tyne, England, announces the sudden death, which occurred on the 22nd ultimo, of Mr. M. Walton Brown, who since 1891 has acted as secretary of that Institution. Mr. Brown had a number of friends in Canada who will regret his loss. The announcement is made that Mr.Percy Strzelecki will act as secretary pro tempore.

The pioneers of the Bishop, Inyo County, California, realizing the services rendered to the prospectors of early days by the patient and hardy burro, have decided to raise a monument in testimony thereof. A life size representation of the burro is hence to be cast in bronze, and on the pedestal will be inscribed: "In acknowledgement of the debt of gratitude from the mining industry of the world to the burro, whose sagacity, patience and endurance have made possible great achievements in mines and finance. This tribute of tardy justice has been erected by the miners of the Bishop Mining District." And it may be added that statues have been erected to the memory of the less deserving though possibly greater asses.



NEW MACHINERY.

The accompanying illustration show recent types of electric mine locomotives as built by The Jeffery Manufacturing Company, of Columbus, Ohio. The designs embody the latest ideas in mine locomotives and street railway motor construction. Every part has been made amply strong and simplified as far as possible without eliminating any of the desirable features. The design is such as to secure the smallest over all dimensions and at the same time allow access to all of the parts. The motors represent the latest ideas in railway practice, such as drum armatures with form wound coils, laminated pole pieces, ribbon wound field coils impregnated with solid compound, oil lubrication with auxiliary grease boxes, and liberal wearing surfaces. The magnet frames are arranged so that the complete motor may be removed from the locomotive by taking off the axle caps, or the frame can be taken apart and the armature removed with very little trouble.

The inside wheel type is to be preferred where the mine entry is wide enough to accomodate the increased width; as the wider locomotive allows more space for the electrical equipment and consequently easier access to the motors, rheostat, controller, etc.

SPECIAL CORRESPONDENCE

NEW BRUNSWICK.

ST. JOHN.—The Drummond Mining Company have great confidence in the future of the iron industry at Bathurst and are now planning to develop the big deposits near that place, which they have recently taken over.

It has been learned that the Provincial Government has given assurance of all reasonable aid. The company will be granted a New Brunswick charter in the course of a few weeks. Diamond drills will be put on the property this winter, mining will be under way early next year and in two years from now, it is expected that 100,000 to 150,000 tons of ore will be annually produced.

It is difficult to say just at present, how many men will be employed, but there should be work for 250 or 300 when the mine is in full operation, and many others will find occupation in other lines developed because of the mines. This is no speculation but a business proposition. The ore deposits are rich and there are some millions of tons of ore in sight.

Mr. John J. Drummond, of the Drummond Mines Company, was in St. John recently, accompanied by Mr. F. C. Parsons, the company's engineer. They had interviewed the local Government, placing their proposition before Hon. Mr. Robinson and his colleagues.

They asked the Government for the right to take power from the Grand Falls of the Nepisiquit River, for conducting their mining operations and for sufficient land actually necessary for their buildings. Mr. Drummond, in putting forward the proposal, said that the company asked only to develop the power along lines to be approved by the executive council and should it be necessary to dam the river, it would be done so as to conserve the power. The plans for the dam and other works would be submitted to the Government for approval and the dam would be so arranged as not to interfere with the work of the lumbermen, or with the fishing interests. The company also asked for surface rights in fee simple on 640 acres over the iron deposits and a grant of 3,000 acres of timber land, under the Mining Act, for mining purposes only; all of the merchantable timber on the property has already been cut over, and the company hopes to be able to make satisfactory arrangements with the lumbermen holding leases. Mr. Drummond also pointed out that the Drummond corporations would be able to use all the ore produced by them at their own blast furnaces.

From $150,000 to $200,000 would be expended in starting developments. Relative to Londonderry, he said they had promised to expend $150,000 there, and now had $1,000,000 to invest in the place. He would not assert positively that blast furnaces and steel works would be established at Bathurst, but said that the natural order of things was that a blast furnace followed upon iron ore mining and that a blast furnace led to steel works. The Drummond corporations, he said, have industries in several places in Canada, and at the outset, the ore raised in Gloucester county would be shipped to supply these. But the output would soon be more than required and there would be shipments of ore to the United States and the old country, as the market offered.

With blast furnaces and steel works established at Bathurst and the mines in operation, he said, probably 1,000 men would find work as a result of the development of these deposits. The I. C. R. is arranging to run a branch line to the mine, and to tide water at Bathurst, and harbor. Stores would of course follow the development, and in all it meant much for Bathurst and, indeed, for the entire province.

The New Brunswick business will be practically in charge of Mr. Drummond and his brothers and the estate of the late Dr. Drummond.

Advices from Campbellton are to the effect that a company of Miramichi men, headed by James Robinson, ex-M. P., intend developing an iron property in Gloucester County adjoining the Burns property, and owned by W. E. Fish, of Newcastle.

The property is believed by those interested to be fully as valuable as that now controlled by the Drummond people, and is five miles in length.

Messrs. James S. Gibbon, Charles S. Gibbon, William E. Vroom and N. S. Springer, of St. John, and Charles I. Spasker, of Newcastle, are incorporated as the "Winter Port Coal Mining Company," with a capital of $99,000. The object is to acquire certain lands of the Messrs. Gibbon, fronting on the Grand Lake, for carrying on a coal mining business.

The quarrying of limestone, which used to be an important industry in the vicinity of St. John, has every appearance of reviving. William Ryan, of Brookville, is quarrying on quite a large scale, the product of the quarrires being sent to points on the Miramichi, for use in the pulp mills.

Information from Hopewell Hill is to the effect that James Blight, of Hillsboro has a crew of men at work at the old plaster quarry near the village. This quarry was worked about seventy years ago or more, when a tram road carried the output to the shore, where it was placed aboard small schooners. J. E. Dickson was among those interested in the quarry at that time, but the work had to be abandoned on account of the heavy expenditure involved in keeping the quarry drained. The plaster is of a good quality and to be found in large quantities.

The Dominion Iron & Steel Company in addition to leasing the property of the New Brunswick Iron Company, have purchased 2,000 shares of the company's treasury stock, at $25 a share.

They will bear the entire cost of the work of development which will involve a very large expendiutre.

As stated in the last issue of the CANADIAN MINING JOURNAL, Axel Andenberg, the expert mining engineer, went to Lepreaux late in November, and has since made a thorough examination of the property, which will be opened up on a large scale. The Iron & Steel Company's representatives are now on the ground. The ore, which is magnetite, is said to be equal in quality to the celebrated Swedish ore, being very high in iron and very low in sulphur.

There could be no better indication that the proposition is one of big value, than the fact that the Dominion Iron & Steel Company have taken hold of it, and, with their immense resources a great industry will no doubt be built up at Lepreaux. The logical outcome is the erection of smelting works and the manufacture of iron at the seat of production.

The New Brunswick Iron Company had expended some $40,000 on the property, but owing to lack of capital were obliged to abandon the work about a year ago. The Dominion Iron & Steel Company have been aware of the value of the deposit and only awaited an opportunity to interest themselves in it. Their lease is for eighty years.

Mr. Andenberg has for the past year been engaged with the Lackawanna Iron Company, at Lebanon, Pa., and resigned his position to go with the Dominion Iron & Steel Company, when they leased the property.

The directors of the New Brunswick Iron Company, are James F. Robertson, St. John, N.B.; J. S. MacLennan, Sydney; E. P. Jones, manager of the Dominion Iron & Steel Company; F. A. Crowell, Sydney! and C. V. Wetmore, also of Sydney. Mr. Wetmore is president, Mr. Crowell, vice-president and Peter Clinch, of St. John, secretary-treasurer.

A writer of old times notes, published in a St. John daily, refers to an item from the "Miramichi Gleaner" of June 2nd, 1838, showing that the mining area in Gloucester County, which was recently procured by representatives of the Drummond Mines Company, of Londonderry was known to exist and was developed to some extent by an English company at that time. The item referred to reads as follows:—

"Gloucester Mines.—Mr. Stevens, the gentleman who has purchased the privilege of working the mines in this country, and who proceeded to Great Britain last fall with several specimens of ores, which he had collected, arrived in the Queen, accompanied by a number of miners, for the purpose of prosecuting his researches. They proceeded to Bathurst in the steamer Cape Breton on Monday last. Mr. Stevens has been so far successful in the mother country as to form a company, with ample capital to work the mines, should the ore on further inspection prove sufficiently rich and abundant. The specimens of copper ore, more especially which he procured, we understand are unusually rich."

On Saturday, December 7th, Dr. A. O. Earle, K.C., engaged as commissioner, took the evidence of Peter Clinch, secretary of the New Brunswick Iron Company, in a suit in connection with that company.

The suit is between Mr. Charles W. Young, of St .Stephen and Mr. C. V. Wetmore, of Sydney. Both were directors of the company and in order to raise money for development work, these gentlemen endorsed notes for the company. When it became necessary to take up these notes Mr. Young became responsible for paper to the amount of some $3,000 and Mr. Wetmore for about $6,000. Mr. Young now seeks to hold Mr. Wetmore liable, and Mr. Wetmore in a counter-claim contends that Mr. Young should share in the $6,000 for which he became responsible. Hon. H. A. McKeown is acting for Mr. Wetmore and L. P. D. Tilley for Mr. Young. The evidence of Mr. Mr. T. B. Blair, manager of the St. John branch of the Royal Bank, of Canada, was taken by Mr. Belyea on Monday, December 7th.

ONTARIO.

Cobalt.

City of Cobalt Mining Company.—One car of No. 1 ore and one car of No. 2 ore were shipped to the American Smelting & Refining Company on November 13. Their weights were 37,000 pounds and 64,000 pounds respectively. The No. 1 will probably run 4,000 ounces per ton and the No. 2 400 ounces per ton. The shaft is now down 125 feet and will be sunk to 150 before the second level will be started.

Trethewey.—A car of first class ore was shipped from here to Copper Cliff on December 8th, weighing 60,000 pounds. This will probably run 3,000 ounces to the ton.

The No. 2 shaft is now down 95 feet.

Coniagas.—3 cars have been shipped this month. One of ore, one of mixed concentrates and ore, and one of concentrates.

Green Meehan.—This property has closed down temporarily while the compressor is being repaired.

Elk Lake.—The winter road from Earlton to Elk Lake was completed on December 19th, and by Xmas the stage will be making regular trips.

Silver Leaf.—The shaft sunk on the new vein is now down 58 feet. Here there are 5 pay streaks. The general average across the vein is better here than it has ben at any othr point.

On Thursday, December 19th, the La Rose Mining Company, put up bonds to ensure payment of $168,000, the amount awarded to the Right of Way by the commission of engineers who examined and sampled the drift from which the ore was taken, subject to the decision of the Courts respecting title.

All the parties concerned have accepted the decision of the engineers.

A remarkable proof of the correctness of their estimate is the fact that immediately after the estimate was made, 2 cars of ore were shipped from the drift sampled and the returns were within 5 ounces of the estimated value.

Muggsley Concentrator.—Work on this concentrator is proceeding very satisfactorily. It is expected that they will be ready to crush in February or March. The mill will handle 100 tons per day of the low grade ores of the camp, by what is known as the combination process of silver mining, which consists of concentration, pan amalgamation and cyaniding. The concentrator consists of jigs to take out the coarse native silver and smaltite. The entire jig tailings will be crushed by stamps and the product classified by a Richards classifier. This spigot or coarse material, will be treated on Wilfley tables, the overflow of the classifiers going into tanks. The product of the tanks is treated on Frue vanners. The tailings of both tables and vanners will be treated by cyanidation and pan amalgamation.

The company are convinced (having made a number of practical tests) that to treat the ores of this camp successfully, something more than simple concentration is necessary. They intend to separate as much as possible, the native silver from the cobalt and niccolite, retorting and melting the silver at the concentrator.

The American Smelting & Refining Company have now a local reprepresentative in the camp, who is attending to the shipments to the various plants of the company, and also purchasing ore. In speaking of the difficulty of smelting cobalt ore in quantity, he says, "This ore is difficult to reduce and can only be used in small quantities, so it is common for smelters to be overstocked. To avoid this and to prevent delays to shippers, the company are now receiving carload lots at their different plants, notably at Perth Amboy and Denver, and are prepared to receive this ore at Chicago, Omaha and Pueblo.

The high grade ore is paid for by us, in cash, as soon as the ore is run into the silver bars. The low grade is cash at thirty days.

ALBERTA.

Edmonton.—Owing to the continued mild weather the price of coal has dropped from $4.00 per ton to $3.50 per ton.

There is quite a glut of coal on the local market due to the "farmers' mines" as the numerous small mines in the district are called, opening up for the winter trade. There has practically been no snow yet and the thermometer has never yet reached the zero point this winter, hence the consumption of domestic coal has not been large enough to take up the production.

The Edmonton Board of Trade has issued a statement regarding the coal mines in the Edmonton district. This statement gives the number of mines as 26, with a daily output of 2,620 tons. Edmonton during last winter exported coal to Winnipeg, Dauphin, Prince Albert, Saskatoon, Regina, Battleford, Vermilion, Vegreville, Daysland, Wetaskewin, Calgary and intervening points and is doing the same this winter.

The name and location of the various mines in the Edmonton district according to the records of the Provincial Government are as follows:—

Crafts & Lee, Tofield; Byers Bros., Cloverbar, 8-53-23.4; C. G. Carnegie, Namao, 17-55-25.4; C. F. Carnegie, Namao, 4-55-24.4; Connell Spencer Coal Company, Namao; Cardiff Coal Company, Edmonton, 25-55-23.4; Daly & Lindsay, Cloverbar, 7-53-23.4; Edmonton Coal Company, Edmonton, 18-53-23.4; Edmonton Standard Coal Company, Edmonton; Fraser & Freeman, Strathcona; Frank Coal Mine Company, Edmonton; Wm. Humberston Company, Edmonton, 7-53-23.4; P. F. Ingram, Tofield; Keith & Dulton, Cloverbar; Ketchum Coal Company, Cloverbar; Lindsay Bros, Namas, 9-55-24.4; John Milner, Edmonton; Milner-Benner Coal Company, Edmonton, Bush Mine; Rosedale Coal Company, Edmonton, R.L. 28-30; P. Otewell, Cloverbar, 17-53-33.4; Parkdale Coal Company, Edmonton; Strathcona Coal Company, Strathcona; United Collieries Ltd, Edmonton; Western Coal Company, Edmonton, 7-53-23.4; Watson Bros., Namao, 16-53-24.4 and White Star Mine Company, Strathcona, 25-51-25.4.

Geo. H. Shaw, traffic manager of the Canadian Northern Railway, when on a recent business trip in the Edmonton district, in speaking of the coal mines, said: "At the Morinville mine, about 20 miles north of Edmonton, they have a shipping capacity of about 750 tons daily. Other mines around Edmonton have at present a shipping capacity of 250 tons daily. As yet these mines are being worked on a small scale, but there is a great future before them, and the coal is good. We have enough power and cars to take the fuel away as fast as it is ready for shipment. It is taken south as far as Calgary and east as far as Regina, and in fact almost to the border of Manitoba.

STRATHCONA.—For some time past there has been a slight difficulty between the Strathcona Coal Company and their employees, resulting in an application being made to Ottawa for a Board of Arbitration to be appointed under the Lemieux Act.

The miners in the employment of the company belong to the labor organization of the United Mine Workers of America. The men are paid a lump sum of 90 cents per ton for all coal mined, this price to cover timbering and car pushing. The men want extra remuneration for car pushing, over and above their tonnage rate. The company claims that if car pushing has to be paid for then the tonnage rate will have to be reduced.

FRANK.—During the past week examinations held by the Examining Board of the province has been conducted at Frank for the purpose of examining candidates for 1st, 2nd and 3rd class certificates of competency to act as coal mine officials. Over 40 candidates presented themselves for examination. This is by far the largest number of candidates ever examined at one time in the province, and is a clear index of the growth of the coal mining industry along the Crow's Nest branch of the C.P.R.

The examining board consisted of the two Provincial Mine Inspectors and two other members—one representing the miners and the other representing the operators in the province. These examinations are held yearly, according to the Coal Mines Regulation Act. Before anyone can become a mine official in Alberta, it is necessary that he shall hold the proper Alberta certificate of competency, qualifying him for such position. Certificates from Great Britain, United States, or from other provinces in the Dominion are not recognized, and all mining officials must take the Alberta examination, no matter what their other qualifications may be.

LEZHBRIDGE.—The Board of Arbitration appointed under the Lemieux Act to investigate the dispute between the Alberta Railway and Irrigation Company and their employees in the Galt mine, has given its decision in favor of the company. It will be remembered that the point in dispute was the interpretation of a clause in the mine workers agreement, as to whether a pony driver should be paid from the time he harnessed his horse or from the time he commenced to haul coal.

Although the Board found in favor of the company, General Manager Naismith announced that the offers made to the men previously will still hold good. By agreement the men will work eight hours at the place of work, but will be allowed pay for half an hour extra for the time spent in going to and from work.

TABER.—The Arbitration Board investigating the disputes between the operators and miners in this district is being held in obeyance for the present, as there have been changes in the management of some of the mines, and offers are being made to bring about a settlement with the new managers, without having recourse to arbitration.

SASKATCHEWAN.

REGINA.—Representatives of two of the largest coal firms in the province—Whitmore Bros. and Smith & Ferguson Company are back from a trip to the mines at Bankhead, near Banff, Alta, and the Galt miners at Lethbridge, and confirm the report of a possible coal shortage this winter. Both representatives state that the mines are running half shift, owing to the scarcity of skilled labor, and that the present supply is only about equal to the demand during the mild weather. One firm is now completely out of coal in the city, and the mines cannot fill orders. With cold weather for a few days suffering from lack of fuel would be distinctly felt throughout this province.

The C.P.R. officials at Winnipeg state, however, that hundreds of farmers in Manitoba and Saskatchewan, especially in the districts which suffered most last year, have a year's supply of coal in their barns now, and this will relieve the situation to a great extent.

SASKATOON.—When coal was discovered a few months ago near Eagle Lake the Provincial Government sent out an expert to examine and report on the quality and quantity of the mineral. The report they received was to the effect that the coal was a lignite, and although continuous over a considerable area was rather thin.

On receipt of this report the Provincial Government approached the Department of the Interior, at Ottawa, with a view to securing a coal field at Eagle Lake. Arrangements have now been completed between the two Governments, and the Provincial Government has undertaken to open up and work a mine on the property, to supply the needs of the settlers in the surrounding country.

The Eagle Lake district lies about 60 miles, in a westerly direction, from Saskatoon, and is entirely devoid of timber except for a small patch of scrub here and there. Last winter the settlers experienced great hardships for lack of fuel. The roads were all blocked with snow, and even when fuel was obtained at railway points it could not be hauled in. Saskatoon is the nearest railway centre to the coal fields. The only other known coal being worked in the province at the present time, is in the Souris Coal Field, which lies in the southeast corner of the province. Here too we find a lignite coal, but the veins are all of a fairly good thickness, and are fortunately situated close to the Soo Line and its branches.

The Provincial Government have secured the services of Mr. J. Davies, who is a prominent Welsh mining engineer, and has been in the West for some time, in the interests of Welsh capitalists, who have invested heavily in coal lands in the Crow's Nest Pass.

Mr. Davies is at present in Saskatoon procuring the necessary wagans, tools, timber and labor, and when he has his outfit ready will proceed at once to Eagle Lake and commence mining operations. Mr. Davies will bring to bear on the work a long experience as a colliery manager and mining engineer in Great Britain. There will be a considerable difficulty experienced in obtaining the necessary timber for roof supports in the mine, as there is no timber grown in the neighborhood, and all the mine props will have to be hauled a distance of 60 miles in wagons, from Saskatoo, which is at present the nearest railway point.

BRITISH COLUMBIA.

Things have gone smoothly during the past two weeks with the Rossland mines and nothing of an unusual nature has cropped up. The men seem satisfied with the wages they are now receiving, and the mines are shipping good quantities of ore. The Evening Star mine has been leased by a local man, and from the present outlook it is hoped by the lessees to ship about 1,000 tons of ore from that property during the next six months or so. A car of ore has already been shipped. There is some talk of one or two of the other small properties being taken up and worked under lease. Those who have leased the smaller properties around this camp, heretofore, seemed to have lost interest after shipping a car or two of ore, and have invariably stopped work. The fact of the matter is, it takes a lot of money and work on a large scale to handle the low grade ores of this camp, at a profit.

For the week ended December 14th, Consolidated Company shipped 4,235 tons; Le Roi 2,555 tons; Le Roi 2, Limited 630, total for week 7,420; for year to date, 259,579 tons, of ore.

In the Boundary Country the issue of the day is the stand the miners have taken in the matter of a reduction of wages by the Granby Company. As mentioned in last letter, the Granby Company posted notices that they would begin work December 5th, and would pay the same scale of wages then prevalent in Rossland, Butte and elsewhere; that is $3.50 for miners, $3.00 for shovelers, for eight hours; blacksmiths $4.00. carpenters $3.50 for nine hours, and so on down the line. On December 7th, the whistles blew at the Phoenix mines as a signal of the resumption of work but none of the miners applied for their old positions at the lowered wage scale. It is stated that about forty men presented themselves at the smelter, at Grand Forks, and that around twenty were put to work. Since that date many different statements have been made, contradictions were published, meetings of the miners and smeltermen, have been held, the business men have had convocations, the mine owners have been approached by various interests, but despite all this, up to the time of this writing the situation was just about where it was on the seventh instant. While there is no particular ill feeling manifested it is thought that if the Granby Company bring men in from the outside to work their propererties, that there will be more or less friction. However, everyone in the Boundary district is in hope of an amicable settlement being reached, probably before this article is published.

Mr. Wm. Waldie, of the Queen mine, in Ymir district, who has recently purchased an addition to his stamp mill is now about to place a larger hoisting engine and a twelve drill compressor on his property. The mine is looking better than it has ever before.

The people who have the Hewitt mine, near Silverton, under bond are showing great activity and have placed orders for compressor plant, machine drills, etc. There is lots of ore in sight in the mine and as soon as possible an output of about 100 tons per day will be made.

Work is proceeding steadily on the Vancouver, which belongs to Le Roi 2, Limited, Rossland, and the Wakefield, in the same district.

La Plata mine, above Kokanee, is now milling 375 tons of ore per week. Mr. A. C. Garde is in charge of the property at present. Mr. Garde is also superintending the work being done on the Argenta.

The St. Eugene mines and the coal mines along the Crow's Nest Line are working industriously and making a good output. There is an over abundance of labor along "The Crow" just now, but the coal mine operators claim that there is no abundance of cars for coal. New strikes of very good coal of bituminous and semi-bituminous grades are reported regularly. One can hardly realize the amount of coal there is in the Crow's Nest district. The fact is the whole country there is traversed by seam after seam of good coking and domestic coal.

The wave of financial disturbance has not hit this country very hard so far. Money seems plentiful and most of the men now out of work have sufficient capital ahead to carry them over until spring, when it is hoped that the mining, lumbering and other local industries will be running full force again and, if anything, that conditions will be on a better basis than heretofore.

NOVA SCOTIA.

Glace Bay.—On the 5th December immediately after our last fortnight's correspondence was written, the Dominion Coal Company posted the schedule of revised rates then referred to. The company's notice read as follows:—

DOMINION COAL COMPANY, LIMITED.

The present Three Years Contract with our mine workers of the P.W.A. terminates 3rd JANUARY, 1908.

SCHEDULE ONE shows rates and conditions that will come into effect on the termination of the present contract unless a new contract is made.

SCHEDULE TWO shows the ADVANCED rates offered if a NEW CONTRACT is made on or before 16th December, 1907.

THE ADVANCE is offered for the sake of having a CONTRACT BY 16th DECEMBER on which to base our programme and sales, and after that date a new contract will not be discussed nor will any advance be made in the aggregate outlay for labor called for by Schedule One.

The offer of the advance in Schedule Two is made WITHOUT PREJUDICE TO OUR RIGHT to establish Schedule One if the offer is not accepted.

G. H. DUGGAN,
2nd V.P.

The Schedules are too long to reproduce here, and in detail they have only local interest. Briefly the alterations proposed are as follows. The machine cutting rates show the following increase:—1 1-2 cent per ton at No. 1 Colliery and No. 7, and 1 cent per ton at Reserve. Reductions are Nos. 3 and 4 mines, 6 cents and 1 cent at No. 9. The loading rate is increased by about 3 cents per ton at all the mines. All pillar rates are reduced 4 1-2 cents. Mine mechanics and shiftmen getting over $1.65 per day are to be increased 3 per cent. The rate of day wages for laborers now $1.38 will be made, minimum $1.38 maximum $1.52, men to be graded by managers.

Under Schedule 2 no reductions are made in machine cutting rates, and the following increases are shown, No. 1 and 7 mines 2 cents, reserve 1 1-2 cents, No. 2 mine 3 cents, Nos. 6 and 9 mines 1-2 cent, Nos. 3 and 4 no change. Loading rates are increased as follows:—No. 1, 5 and 7 mines 4 cents, No. 2 mine 3.7 cent, Nos. 3 and 4 mines 3-4 cent, No. 6 mine 3 cents and No. 9 mine 2 cents. An extra 2 cents is given on the shearing and the pillar rate is reduced 3 1-2 cents only as compared with 4 1-2 cents on Schedule 2. All hand mining at No. 8 mine is increased one cent per ton, and 5 per cent. increase is given to mine mechanics and shiftmen. On both Schedules the price of house coal is to be $1.00 for slack coal and $1.50 for run of mine exclusive of hauling.

Under the scheme of rates proposed in Schedule 1 the company calculate an increased payroll to the extent of about $16,000. Under Schedule 2 the increase to the company would be about $70,000 per year.

The men decided at their lodge meetings on the 14th, to reject the company's proposals, and the company were informed on the 17th, that the P.W.A. definitely rejected the company's proposals and asked their original demands of a 15 per cent. increase to mechanics and shiftmen, and a minimum rate of $2.44 per day for miners working by day wages, when out of working place. In the meantime on the 16th the company had posted notices to the effect that the option of making a contract under Schedule 2, having expired they would put Schedule 1 into effect on the 6th day of January 1908.

The Grand Council of the P.W.A. meet on the 27th inst., at New Glasgow, and it is expected they will then decide as what form their opposition will take. They have instructed the Grand Secretary to write the coal operators of Nova Scotia demanding by the first of May next a 15 per cent. increase for mechanics and laborers and $2.44 for miners out of places.

It is conceded by everybody that the increased rate for loading coal is a good move, but the P.W.A. as a body are not inclined to look with favor upon any adjustment of wages that concerns any one class of men. In the present case the [illegible]

natural because the pillar men has a good deal to say in the Councils of the P.W.A. and the loader is unrepresented.

The new schedule will therefore become effective on the 6th January and there is every reason to believe that it will result in improved conditions for everybody concerned. It is expected that the new rate for loading will attract enough men to prevent any loss of output through want of loaders, and that in consequence the machine runner will be able to work full time. The reduction on the pillar rate will not affect these men so hardly as one would think, for if the contentions of the company's officials are correct these men have only to work the hours the other men work to still retain their supremacy in the matter of wages earned. The Coal Company state that their mining costs have increased about 27 per cent. in the past three years and that they cannot afford to make any general increase in wages, but are willing to make adjustments to get a more equitable division of the payroll. They asked for the co-operation of the men and their advice in doing this. This was refused, and the new schedule embodies what the management of the company think is a better scale of wages than the one now in force.

It is not probable that anything further will transpire until after the new rates have gone into effect, and as these rates are an increase to a majority of the company's employees, it is not anticipated that any very strenuous opposition will be made by them, and nothing in the noture of a stoppage of work is likely to happen.

GENERAL MINING NEWS

NOVA SCOTIA.

SYDNEY.—It is reported authoritatively that the Dominion Iron & Steel Company has consummated a deal whereby it acquires the coal areas of the Cumberland Coal & Railway Company at Cow Bay Cape Breton.

The Cow Bay coal areas, leased by the Dominion Iron & Steel Company, are owned by the Cumberland Railway & Coal Company. This last named company's largest shareholders are the Cowan's Estate, Sir George A. Drummond, the Macdongall Estate, David Morrice and Crossen's Estate. The Cumberland Company is to receive a royalty of 10 cents per ton on all coal mined. The areas are ten miles east of the steel plant and comprise about 30 square miles of land.

GLACE BAY.—About 1,600 tons of coal are now banked at the Bridgeport Colliery.

The Dominion Coal Company is erecting four new batteries of boilers at New Aberdeen No. 2 Colliery. A self-oiling system is also being installed on all the engines. The bankhead is being repaired and new dwellings built.

HALIFAX.—The arguments on the appeal of the Dominion Coal Company against the decision of Mr. Justice Longley are now almost closed. The case for the Dominion Steel has been opened. The point on which the case hinges is whether the contract did or did not call for a supply of coal suitable for the uses of the Steel Company. The case is now adjourned until after the Christmas holidays.

ONTARIO.

TORONTO.—The approximate returns to the Bureau of Mines for the nine months ending September 20th, 1907, are as follows:—Silver, 6,919,987 ounces; copper, 5,111 tons; nickel, 8,087 tons; iron ore, 141,719 tons; pig iron, 180,663 tons; steel, 120,077 tons; zinc ore, 400 tons. The silver is valued at $4,212,000. The 1906 production was 5,401,766 ounces, worth $3,667, 551. The copper produced in 1906 (12 months) was 6,072 tons; nickel, 10,926 tons; iron ore, 128,049 tons.

OTTAWA.—The Board of Conciliation in the McKinley Darragh mine dispute has agreed upon Professor Adam Shortt of Queen's University as chairman.

CRAIGMONT.—The Canada Corundum Company has closed down its works for the winter on account of the business depression in the United States, resulting in a reduction in the orders for prepared corundum. A considerable stock of corundum is being held at Craigmont and orders will be filled throughout the winter. A small staff is being retained at the works to attend to the shipping and repairs. It is the company's intention to resume full operations next March.

LARDER LAKE.—The government road between Boston and Larder Lake has been completed. The water front has been reserved by the Government, also certain blocks of the town site.

COBALT.—Cobalt Lake mine is progressing. The north shaft is down 65 feet. A drift from this shaft has been started west. Shaft No. 4 is down 158 feet. Here also a drift is being started under the lake. A total of 1,256 feet of drifting, cross-cutting, sinking and raising had been done up to December 10th. More than 150,000 pounds of ore was then ready for shipment.

A rich vein of silver 16 to 18 inches wide is reported to have been struck at a depth of 263 feet on the Temiskaming property.

Concentrators are now at work at Coniagas, McKinley-Darragh and Cobalt Central properties. The Nipissing concentrators will, it is expected, be in operation by January 15th.

Two cars of ore were recently shipped from the Foster, averaging 42,000 ounces of silver each.

The Mahow-Brough property is said to have been taken over by the Haileybury Silver Mining Company.

It is estimated that the Nipissing Mining Company has about 75,000 tons of ore on the dumps. The average assays will run from 20 to 50 ounces to the ton. The company has not, as a rule, shipped ore running below 200 or 300 ounces to the ton.

The number of workmen employed on the Nipissing has been reduced from 300 to about 240. Very little surface work is being done. Underground development will be the principal form of activity during the winter.

On the 100-foot level at the Red Rock a vein of cobaltite, carrying some silver, has been struck.

The new compressor plant is now in operation on the Cobalt Central. The new strike on the second level is a vein 12 inches wide. It is reported to be very rich.

COPPER CLIFF.—Shipments from the Creighton and Crean Hill mines are reduced. Rumours of new finds of copper to the south, near the line of the Canadian Northern, are current. More news will shortly be forthcoming.

PORT ARTHUR.—Because many of the contracts made by foundries west of Port Arthur for Scotch pig iron have not yet expired, and because of the present stringency of the money market, the blast-furnace of the Atikokan Iron Company is shut down temporarily. While work is suspended many improvements will be installed. The system of handling coke and pig iron are to be changed and devices installed for handling and granulating the slag. The pig iron now in stock amounts to 3,000 tons.

BRITISH COLUMBIA.

VANCOUVER.—Johann Wulffsohn, German Consul accompanied by O. Gerle, M.E., is examing the Swede group of copper claims on Moresby Island. Near the Portland Canal district, a molybdenum prospect will be looked into.

VICTORIA.—Mr. E. Lindeman, appointed by the Dominion Government to look into the iron deposits of Vancouver Island, has made a tentative press report to the local papers. Mr. Lindeman is a Swedish expert and is well-versed in the study of iron ore deposits generally.

Mr. Lindeman started on his mission in June 1st of this year. His instructions were to cover the field generally. The task is a large one and it kept Mr. Lindeman moving to accomplish as much as he has. He began by examining the Sooke river deposits. Then he made his way north by the west coast and returned by way of Texada Island. He found very little development work done. On Texada Island, however, he found what he considered the best deposits. These were situated on the Quinsan River, on the Kla-anch River and at Head Bay on Nootka Sound.

Mr. Lindeman especially emphasizes the fact that all of these properties are yet in the category of prospects. Very little has been done, although more has been accomplished on Texada Island than elsewhere.

Speaking of this last named property Mr. Lindeman mentioned that considerable shipments had been made to Irondale, Wash., by the Puget Sound Iron Company.

A magnetic survey of the Kla-anch River deposits indicated the existence of large bodies of iron ore, 50 to 60 feet wide, and extending over 500 feet in length.

The diamond drill is recommended by Mr. Lindeman as the most satisfactory means of exploring. In summing up the possibilities of the country, he is confident that iron ore of good quality exists here in commercial quantities.

Except at Quatsino Sound the ore is magnetite. At that place a low-grade limonite is encountered. Much of the ore will probably average more than 60 per cent metallic iron.

Limestone there is in abundance and coke is readily available at a moderate price. The local market for pig iron should be good. There is, further, the chance of developing a trade with China and Japan.

Finally, Mr. Lindeman recommends the erection of a small blast furnace and a rolling mill. Charcoal could here be used instead of coke. This might be the nucleus of a large and thriving industry.

Bituminous coal has been discovered in the northern Cariboo district. Twenty square miles have been located on the main line of the Grand Trunk Pacific, about ten miles from the Grand Canyon of the Fraser River. Many thin seams have been discovered along with one or two of workable size.

ATLIN.—The steam shovel of the Atlin Consolidated Gold Mining Company, which started work on June 7th, stopped for the season on October 18th. The output of the season amounted to $80,000. A new sluicing station will be made next season farther up Pine Creek.

ROSSLAND.—A. K. Idler has secured a lease of the Evening Star mine. Twenty tons of ore are ready for shipment to Trail.

NELSON.—Excepting the Boundary region, the mining districts are in good shape. Zinc is attracting attention. If the lead bounty is removed there will be large developments in Slocan and East Kootenay. The Vancouver mine, Slocan district, has shipped 900 tons of zinc ore to Antwerp and is selling its lead concentrates to Trail smelter.

The Nelson Board of Trade has put itself on record as being entirely in favor of a renewal of the lead bounty for a further period of five years. The mine owner's memorial is in part as follows:—

"That said lead bounty has, by insuring a stable minimum price, been most effective and beneficial to the lead mining industry, with it to the smelting and manufacturing industries, and consequently to the general commerce of the Dominion.

"'That such results have been produced by a relatively small expenditure, as was anticipated, and as was represented when the original request for consideration was made to the Government. Out of $2,500,000 originally voted to be expended in the period of bounty termininating 30th June next, but $616,976.02 have been expended up to 1st December, 1907."

YUKON.

DAWSON.—The Guggenheims will employ many men and teams this winter in hauling 3,000 tons of pipe-line material from Twelve-Mile Landing, on the Yukon below Dawson, to points on the line of the big Twelve-Mile ditch. 4,000,000 feet of lumber will be hauled from the Twelve Mile mill in the spring. The work on the large dam on Bonanza Creek has been finished. From here electrical power will be distributed to the new electric lifts, new devices for working creek bottoms.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The use of coal-cutting machines is steadily increasing in the United Kingdom. Thus the statistics show that in 1906 there were 333 collieries employing coal-cutting machines as against 295 in 1905. The total number of machines in use was 1,136 (as against 946 in 1905), of which 451 were worked by electricity and 665 by compressed air; the total quantity of coal obtained in 1906 by the aid of these machines was 10,202,506 tons, an increase of over two million tons as compared with the returns for the preceding year.

For the ten months of the present year, ending October 31st, exports of coal from Great Britain amounting to 54,816,190 tons were made, the value of which is placed at £34,516,460, an increase in value of over eight million pounds sterling above that of the total exports during 1906. This increase is attributed to heavier shipments to France, Germany and Italy.

The thirteenth annual statement of the coal production and consumption in the principal countries of the world has been issued by the Board of Trade. Production was made as follows: United Kingdom, 251,068,000 tons; Germany, 134,914,000 tons; France, 33,762,000 tons; Belgium, 23,232,000 tons; United States, 369,672,000 tons. Consumption is shown in the following statement: United States, 361, 492,000 tons; United Kingdom, 174, 329,000 tons; German, 119,282,000 tons; France, 50,298,000 tons; Russia, 25,786,000 tons; Belgium, 22,509,000 tons; Austria Hungary, 21,181,000 tons.

FRANCE.

The Government has increased the annual grant for the pensioning of aged miners, from a million to a million and a half francs.

An attempt is being made to group all French importers of foreign coal into one organization, the purpose being to act on the public powers, the railway companies, the Chambers of Commerce and others interested in the regulation of the foreign trade conducive to the interest of French buyers.

A decree signed by the President of the Republic, establishes, in the event of military requisitions necessitated by war, that the military authority, aided by the mining engineers, shall summon coal companies to supply whatever quantities of coal, coke and manufactured fuel as might be required.

GREECE.

The mineral production of this country last year was valued at £843,648, a very substantial advance over the 1905 returns. The chief mineral products of Greece are argentiferous lead, iron, calamine and magnesite.

UNITED STATES.

The production of platinum in the United States last year was 1,439 ounces, which owing to the abnormally high prices then ruling was valued at $45,189. Thus while in January, 1906, the price was $20.50 per ounce, in November it had risen to $38. Platinum rich in iridium was valued at $41 in February of this year and remained at that figure until April, since when there has been a steady decline, the price to-day being $26.50 for ordinary and $29 for hard platinum.

Production of pig iron in the United States last month was 1,828,000 tons, the smallest of any month in two years. In all 78 furnaces were blown out during the month,, reducing the number to a hundred and eighty-seven.

The November production of copper of the Butte district is placed at 8,376,200 pounds, a slight increase over October. Meanwhile the directors of the Amalgamated Copper Company have ordered that all the mines of the subsidiary companies, with the exception of the three mines of the Boston & Montana Company, be closed, and by the end of the month in consequence, operations will be suspended at the Anaconda, Butte, Boston, Washoe, Parrot, Trenton, North Butte and Butte Coalition mines, and the Washoe smelter.

The "Mining World," (Chicago), publishes a compilation showing that 114 mines and metallurgical works in the United States have paid dividends aggregating $81,601,426 during the eleven months of the present year, and in addition distribution of profits to the aggregate amount of $14,461,491 has been made by corporations such as the Amalgamated Copper owning interests in subsidiary companies.

It is computed that shipments of iron from the Lake Superior region will total 42,000,000 tons for the season of 1907, thus very considerable exceeding all pervious records in this respect.

The report of the Oroville Dredging Company, just issued, for the year ending July 31st, shows net profits amounting to $502,362. The company paid a dividend of 10 per cent. and placed $94,774 to reserve.

The report of the Homestake Mining Company, of Dakota, shows that the proceeds realized from the sale of bullion amounted to $4,541,096 from 1,264,177 tons of ore milled, having an average value of $3,592 per ton.

In a paper read before the American Mining Congress, Joplin Meeting, costs of operations in the Joplin District, Dr. E. R. Buckley expressed the view that under present conditions an ore body of ordinary size must contain at least 3 per cent. of zinc blende to be worked at a profit and pay a royalty of 15 per cent. with 60 per cent. zinc at $45 and lead at $80 a ton.

A general strike has been ordered in the Goldfield district, Nevada, the miners refusing to ascept payment of wages in the form of script. The Union instructs its members as follows:— "All employers of labor not paying cash or satisfactorily guaranteeing their paper will be declared unfair, and all men are warned not to work for them."

MEXICO.

A consolidation of the Fay-Cananea and Cananea eastern properties has now been effected, but the basis on which the arrangement was made has not been announced.

ARGENTINE.

A new law exempts from Customs duty, during a period of ten years, machinery, tools, and materials necessary for the installation and working of mining and metallurgical establishments, and also machinery for well-boring. In order to obtain the exemption in question, written application must be made to the Customs House through which it is desired to effect the importation.

FIJI ISLANDS.

Valuable discoveries of chalcopyrite and bornite are reported to have been made on the west side of Vita Leoua, south of the Mandi River. The Fiji Government has granted a prospecting permit to the discoverers for nearly 300 square miles; and a mining lease at the rate of $1.25 per acre. Specimens of ore from this locality are said to assay as 20 per cent. copper with gold and silver values.

AUSTRALASIA.

The annual report of the Secretary of Mines of Tasmania, recently issued, gives the completed totals of the mineral production for last year. The gold production was 60,023 fine ounces; blister copper, 8,708 tons; copper and copper ore, 2,234 tons; tin ore, 4,473 tons; silver-lead ore, 87,118 tons; iron ore, 2,600 tons; wolfram ore, 20 tons; bismuth ore, 6 cwt., and coal, 52,896 tons. The returns for the first half of 1907 show a falling off in all items except those of gold and coal which show a relative increase.

Queensland possesses very extensive coal areas. At present coal mining operations are confined to the West Moreton and Wide Bay districts, and two smaller centres, but the coal measures are by no means limited to these localities. Coal has been proved to underlie a large portion of the southern part of the State. Fine seams have also been tapped in the central districts, and it is generally believed that deposits of coal extend along the whole eastern seaboard. Operations are being steadily increased year by year, the production last year of 906,772 tons establishing a record.

The Commonwealth output of gold for the first ten months of the present year amounted to 2,620,771 ounces, a decrease of 272,589 ounces compared with the output in the corresponding period of 1906.

In connection with the recent coal miners' strike in New South Wales it is pointed out that "there is probably no industry conducted in the State that has been uniformly more unprofitable than coal mining." And from the figures published it appears that this statement is not an exaggeration, since of fifteen leading companies none has succeeded in paying over 6 per cent. in dividends, while the general average is not 3 per cent.

NEW ZEALAND.

A correspondent in the *Colliery Guardian* remarks that the combined action of the Dominion Government as producer, distributor and retailer of coal, does not appear to have been attended with encouraging results as anticipated. It is contended that the intervention of the New Zealand Government in the local coal trade has not reduced the cost to the consumer one iota, the prices at the various ports remaining the same as before the Government depots were established. Thus, although the Government has been enabled to hamper private enterprise, it finds its efforts to supercede it wholly unsuccessful, and it is not improbable that in the near future the experiment will become regarded as a costly mistake, conveying its own moral.

SOUTH AFRICA.

An interesting experiment is being made by the Village Deep mine, on the Rand, with a new electric furnace which is to be employed in sharpening drills underground. The advantages claimed for this unique furnace are reduction in cost of sharpening, in the saving of labor and delay incidental to carrying drills to the surface to be sharpened, and of overcoming the customary difficulties of overheating and burning the steel.

STATISTICS AND RETURNS.

Cobalt ore statement for the month of November, 1907:—

Nova Scotia Mine, to Copper Cliff, Nov. 28th, 46,730; Nov. 30th, to Copper Cliff, 45,500; total, 92,230.

Tem. & H. B. Mine, to Canadian Copper Company, Copper Cliff, Nov. 30, 67,000; Nov. 30th, 67,000; total, 134,000.

Townsite Mine, to Canadian Copper Company, Copper Cliff, Nov. 28th, 42,000.

Buffalo Mine, to American Smelting & Refining Company, Denver, 40,000.

Grand totals, 5,009,315 pounds.

Cobalt ore statement for the week December 7th to 14th, 1907:—

Nipissing Mines, to New York, Dec. 7th, 63,200; Dec. 7th, 66,090; Dec. 14th, 60,360; total, 189,650.

McKinley-Darragh, to American Smelting & Refining Company, Perth Amboy, N.Y., Dec. 9th, 44,630; Dec. 12th, 97,740; total, 142,370.

Right of Way Company, to Canadian Copper Company, Copper Cliff, Dec. 14th, 59,610; Dec. 14th, 63,080; total, 123,690.

Kerr Lake Mining Company, to American Smelting & Refining Company, Perth Amboy, Dec. 9th, 61,420.

Nova Scotia Mines, to American Smelting & Refining Company, Perth Amboy, Dec. 13th, 63,770.

Grand totals, 580,900 pounds.

SCOTIA COAL SHIPMENTS.

Coal shipments of the Nova Scotia Coal & Steel Company for November and for the 11 months compared with a year ago, were:

Shipments, November, 1907	56,951
Shipments, November, 1906	69,229
Decrease, November, 1907	12,278
Shipments, 11 months, 1907	585,701
Shipments, 11 months, 1906	612,655
Decrease, 11 months, 1907	36,954

The stock of copper in England and France, being consigned to those countries during November, amounted to 15,789 tons. The figures for November of the two preceding years were 14,243 tons in 1906 and 13,690 tons in 1905. The London price of copper, 30th November, 1907, was £63, as compared with £102 12s. 6d. on the same date in 1906 and £77 15s. in 1905.

Outputs of the Dominion Coal Company for the first half of December, 1907:—

No. 1	21,730
No. 2	29,500
No. 3	15,000
No. 4	19,900
No. 5	21,920
No. 6	10,040
No. 7	1,730
No. 8	6,300
No. 9	15,720
No. 10	4,160
	146,000

BRITISH COLUMBIA ORE SHIPMENTS.

Following are the ore shipments and smelter receipts of the mines in Southeastern British Columbia districts for the week ending December 14th and year to date in tons:

Mine.	Week.	Year.
Boundary	35	1,141,052
Rossland	7,155	210,625
East of Columbia River	3,634	167,556
Totals	10,824	1,579,233
Smelter:		
Trail	6,151	254,180
Northport	2,171	96,231
Marysville	600	30,000
Others	.....	1,110,079
Totals	8,922	1,490,490

Arrangements were made at the custom house for the shipment of 900 tons of zinc ore from the Vancouver mine to the Slocan district, to Antwerp. This is the first zinc shipment from this district to Europe. The rate given is $13 a ton.

BRITISH COLUMBIA ORE.

Appended will be found the ore shipments and smelter receipts in detail for the week ending December 14th and year to date in tons:—

Boundary shipments—Week, 35; year, 1,141,052.

Rossland shipments—Week, 7,155; year, 210,625.

Slocan-Kootenay shipments—Week, 3,684; year, 167,556.

The total shipments from the mines in the above districts for

the past week were 10,874 tons, and for the year to date 1,579,233 tons.

Trail smelter receipts—Week, 6,151; year, 254,180.

Le Roi smelter receipts, Northport, Wash.—Week, 2,171; year, 96,213.

Marysville smelter receipts—Week, 600; year, 30,000.

The total amount of recepts reported from the local and foreign mines for the past week kere 8,922 tons, and for the year to date 1,490,490 tons.

The output of the Crow's Nest Pass collieries for the week ending December 13 was 24,536 tons, or a daily average of 4,089 tons.

BRITISH COLUMBIA ORE FIGURES.

The following are the shipments and ore recepits from the Southeastern districts of British Columbia for the past week and year to date:—

Shipments—	Week.	Year.
East of Columbia River	3,453	163,872
Rossland	7,090	263,470
Boundary	.....	1,141,457
Total	10,543	1,568,799
Receipts—		
Trail	5,407	248,029
Marysville	600	29,400
Northport	2,670	94,060
Others	.....	1,110,079
Total	8,677	1,481,568

Bar silver in London has made a new low level for the year, dropping to under 25d. per ounce. The decline is said to be due largely to conditions in India.

The subjoined table shows the range of silver prices, quoted in cents, since 1900:—

1907	70⅛	53⅞
1906	71¾	62⅝
1905	65⅝	55
1904	62	53⅜
1903	61¾	47
1902	56⅛	47
1901	64	54¼
1900	65⅛	58⅞

The highest price since 1900 was attained on November 17th, 1906, when it reached 71 3-4 cents. The low record, 47 cents, was made on three occasions, November 28th, 1902, and January 22nd and 29th, 1903.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works in the Province of Ontario for the nine months ending September 30th, 1907, was as follows:—

	Quantity.
Silver, ounces	6,919,987
Copper, tons	5,111
Nickel, tons	8,087
Iron ore, tons	141,719
Pig iron, tons	180,663
Steel, tons	120,077
Zinc ore, tons	400

Last year's total silver output was only 5,401,766 ounces, so that the product for nine months this year is greater than for the whole previous year. The value of silver has declined. The total last year was worth $3,667,551. This year nine months' product is worth about $4,312,000. Last year's copper production was 6,032 tons, and nickel 10,936 tons.

The following table, which shows the net profits, dividends and surplus after dividends of the Standard Oil Company, from 1902 to 1907, inclusive, the profits for 1907 being estimated, gives a good idea of the Standard Oil Company's tremendous earning power and the large surplus available for distribution to stockholders:—

Year.	Profits.	Dividends.	After Dividends.
1907	$85,000,000	$39,335,320	$45,664,680
1906	83,122,251	39,335,320	43,786,931
1905	57,459,356	39,335,320	18,124,036
1904	61,670,110	35,188,206	26,381,844
1903	81,326,904	42,877,478	38,459,516
1902	64,618,363	43,861,966	20,761,397
	$439,202,074	$239,923,670	$193,678,404

The above table includes only the surplus accumulated over the last six years and not the surplus since the time the company was organized, to Dec. 31, 1901. Until 1902, the Standard Oil Company apparently made it a point to distribute to shareholders each year a very large percentage of the net profits, but this policy was abandoned at the close of 1901.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ended December 20th totalled 22,051 tons, a daily average of 3,675 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	Week ending Dec. 21. Ore in lbs.	Since Jan. 1 Ore in lbs.
Buffalo	.....	2,208,820
City of Cobalt	.....	101,230
Coniagas	.....	4,798,710
Cobalt Central	.....	101,360
Colonial	.....	74,250
Drummond	.....	108,920
Foster	.....	611,806
Green-Meehan	.....	196,780
Hudson Bay	64,000	243,170
Imperial Cobalt	.....	37,530
Kerr Lake	43,700	644,890
La Rose	43,730	5,706,875
McKinley-Darragh	.....	1,407,935
Nipissing	130,599	4,788,249
Nova Scotia	181,000	493,000
[illegible]		[illegible]
Red Rock	.....	91,443
[illegible]		[illegible]
Silver Leaf		93,618
[illegible]		957,157
[illegible]		1,618,138
[illegible]		[illegible]
Temiskaming	.....	430,611
University		61,383

The total shipments for the week were 463,029 pounds, or 231 tons. The total shipments since Jan. 1, 1907, are now 27,956,760 pounds, or 13,978 tons. In 1904 the camp produced 158 tons, valued at $136,217; in 1905, 2144 tons, valued at $1,473,196; in 1906, 5129 tons, valued at $3,900,000.

Company Notes.

The Tilt Cove Copper Company, Limited, at a meeting of the members of the Committee of Management, held in London on November 28, 1907, passed the following resolution:—

"That in interim dividend of 2s. 9d. per share be and is hereby declared on the shares of this company, free of income tax, payable on the 3rd day of December, 1907, to the shareholders on the books of the company on the end of December, 1907, and that the transfer books be closed during the said 2nd day of December, 1907."

Holders of share warrants to bearer are informed that Coupon No. 11 will be paid at the above rate, free of income tax, on presentation at the company's office.

In sending this notice of interim dividend the committee desire to point out that this dividend is based upon the profits for eight months, namely, from 31st December, 1906, to 31st August, 1907.

The directors of the Dominion Coal Company have declared a regular quarterly dividend of one per cent. on the common stock, payable in January.

A special general meeting of the Maritime Coal, Railway & Power Company was held at the Windsor Hotel on December 7th. An issue of new bonds was formally ratified. They replace the old bonds of the companies now amalgamated. The company's Chignecto colliery is being developed rapidly, and its output has materially increased. The power plant is supplying three large Amherst manufacturing concerns. In future, large water shipments will be made and a saving in freight is assured.

The Kerr Lake Mining Company has declared a regular quarterly dividend of 2 per cent., payable January 31st. Books close December 31st and re-open January 8th.

The statement of cash and cash assets of the Nipissing Mines Company, on December 16th, shows a total of $860,000. After $180,000 is deducted to pay the dividends there will be a balance of $680,000. It is said that between now and the time the dividend is payable the company will have received almost enough to pay the dividend, thus leaving the total of $860,000 practically intact.

The annual meeting of the Rochester Cobalt Mining Company is called for December 27th at Cleveland, Ohio.

DE BEERS DIVIDEND PASSED.

London.—The deferred dividend of the De Beers Consolidated Mines, Limited, the diamond syndicate, was passed to-day.

Owing to the unfavorable outlook in the diamond trade, the restriction of purchases in America since the financial disturbances and dumping of large quantities of stones in recent months before the agreement with the De Beers Company demoralized the market, the company has decided that it is necessary to strengthen its reserves in order to maintain prices. A telegram received from Kimberley says the company has ordered work in the diamond mines to be restricted to five days a week.

In his address to the shareholders of the Cleveland-Cobalt Silver Mines Company, the president, J. M. Smith, reported that the company had $33,307.70 in the bank, $48,554.50 in accounts receivable, being the balance unpaid on shares under option, and $749.90 worth of supplies on hand. The assets also comprise power house plant, tools, machinery and miscellaneous equipment, valued at $48,989.56; power house and other buildings, including real estate and telephone plant, $13,375; railway siding, $1,168.31; office furniture, $156.93, and development work, $9,804.13.

WATTS MINE ANNUAL MEETING.

The annual meeting of the Watts Mining Company will be held at the offices of the company, 54 Victoria street, Toronto, on January 15th.

The Northern Exploration Company has declared a dividend of ten per cent.

Directors of Nipissing have declared a regular quarterly dividend of 3 per cent., payable January 21. Books close December 27 and re-open January 22.

The statement of cash and cash assets of December 16 of the Nipissing Mines Company shows a total of $860,000; deduct $180,000 to pay dividends, leaving balance of $680,000. It is said that between now and the time the dividend is payable the company will have received almost enough to pay the dividend, thus leaving the total of $860,000 practically intact.

The annual profits of Le Roi mine have fallen from £37,000 in 1906 to £3,600 for the current year, owing to the drop in copper.

The Buffalo Mines, Limited, have declared a regular quarterly dividend of 3 per cent., payable January 1st, to shareholders on record December 17th.

The McKinley-Darragh Mines of Cobalt have declared a dividend of 4 per cent., payable January 15th. Books close at noon, December 31st and re-open January 10th.

On December 10th the Kerr Lake Mining Company declared a dividend of 2 per cent. and a bonus of 1 per cent., payable on or before January 31st, on all the capital stock of the company. This is the regular quarterly dividend.

MARKET NOTES.

Silver.—December 5th, 57 3-4; December 6th, 57 1-8; December 7th, 56 1-2; December 9th, 55 3-4; December 10th, 55 1-2; December 11th, 56 1-4; December 12th, 55 1-2; December 13th, 54 7-8; December 14th, 53 3-4; December 16th, 54 1-8; December 17th, 53 1-2; December 18th, 52 1-2.

Copper, 18th December, New York.—Lake, 13 1-8 cents per lb.; electrolytic, 12 7-8; London, £58 per ton.

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The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

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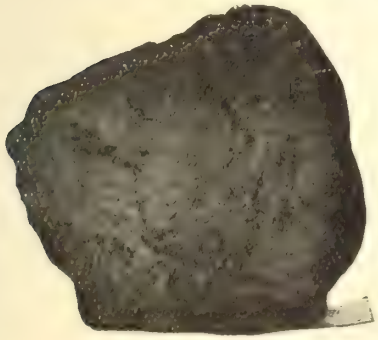
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Mineral Territory Open for Investment in the Province of Quebec

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc. **Ornamental and Structural Materials in abundant variety.** The Mining Law gives absolute security to title and has been specially framed for the encouragement of mining

All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $1 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St. Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries,
Parliament Buildings, Quebec.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

Before purchasing supplies, machinery or equipment, consult the firms mentioned in this Directory. They are prepared to fill your order with all possible despatch. If requiring anything not listed in these columns, address THE CANADIAN MINING JOURNAL and you will be put in touch with responsible firms. In writing advertisers, kindly mention this Journal.

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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Here are "Specials" for mining men, prospectors, and all readers of this paper who have heavy work to do or rough journeys to make.

Clothing "Specials"

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1100 strong, serviceable English, Canadian and Scotch tweed suits, also English corduroy, suitable for business or town wear as well as for men who need strong clothes. Weights are medium and heavy. Regular prices run from $10.00 to $14.00. Sizes 35 to 44. We offer these suits to readers of this paper for **$7.95**

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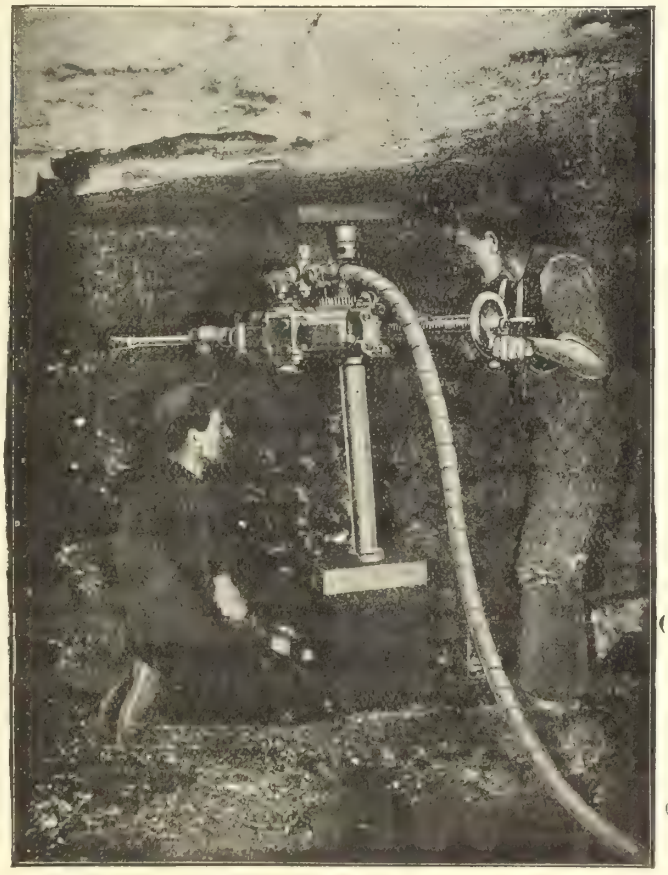
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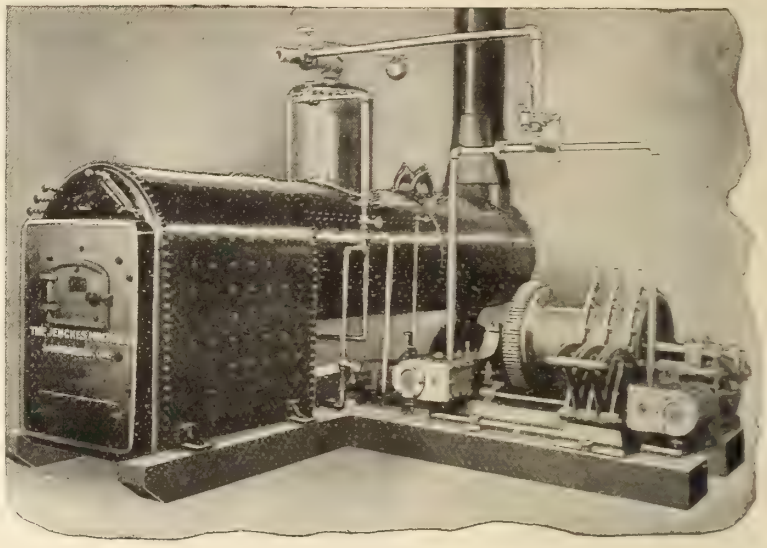
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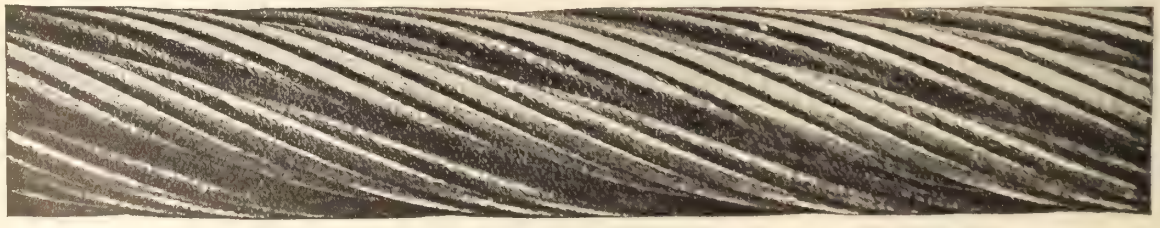
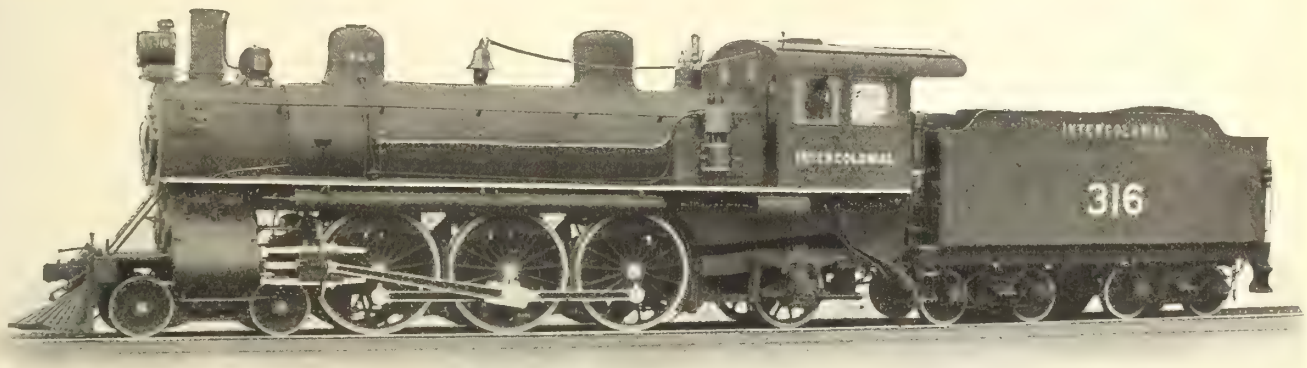


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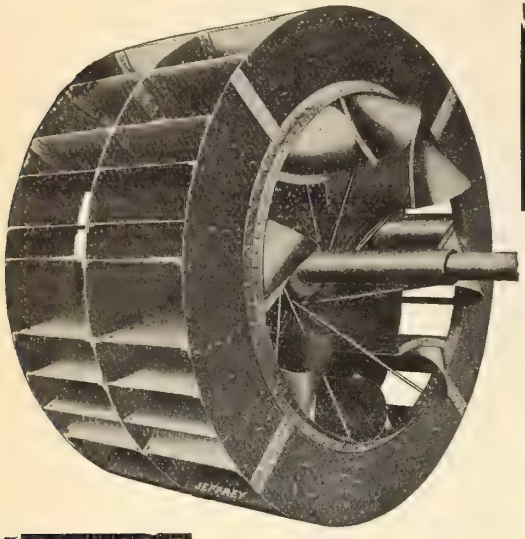
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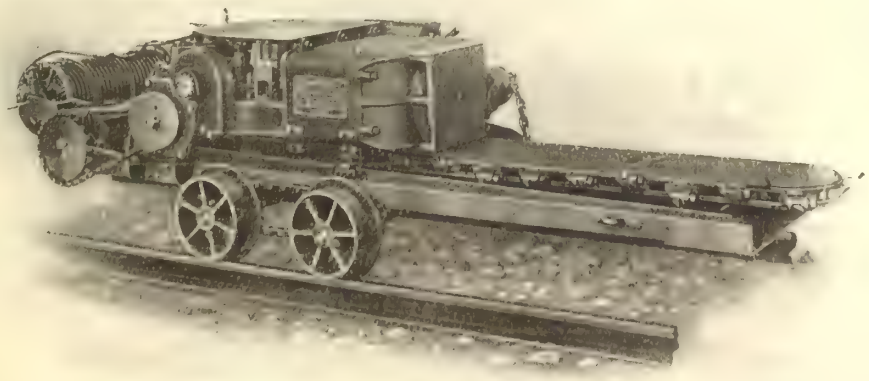
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For Low Coal



Sullivan "Low Vein" Room and Pillar Coal Mining Machine, Class "CE-6," on Self-Propelling Truck

The Sullivan Electric Chain Coal Mining Machine, for Low Vein Room and Pillar mines, makes a continuous cut across the whole face or breast, without withdrawing the cutter bar from the coal, without hand barring or changing of jacks, and without moving roof props.

It requires only 5 feet and 3 inches of space in front of the coal for its operation; it stands 21 inches high while cutting, and 30 inches on its self-propelling truck. This machine shows, in actual work, a cutting efficiency 50 to 200 per cent. in excess of any ordinary chain breast cutter. It may be used with safety under weak roofs, since the props may be permanently set one-half as far from the face, as is required by the latter machine.

A Low Vein Long Wall Machine of the same pattern is also manufactured.

BULLETIN 48-FJ

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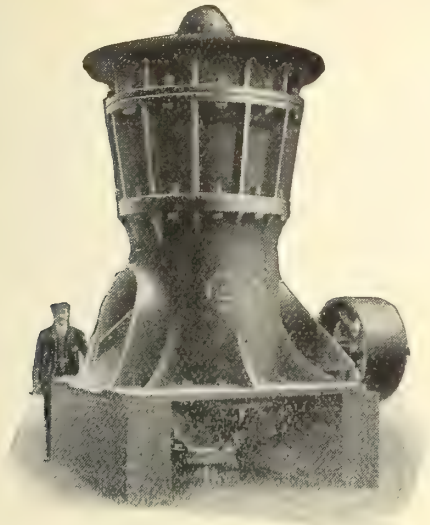
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Heclon Rock and Ore Breaker. Hadfield & Jack's Patent

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of every description.

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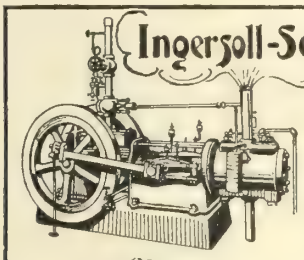
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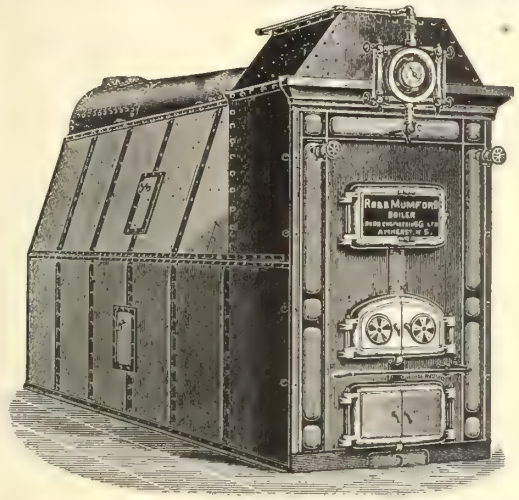
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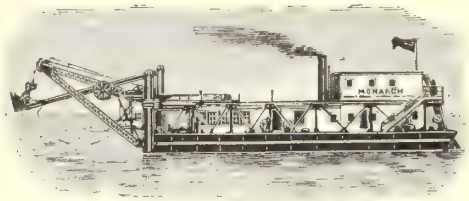
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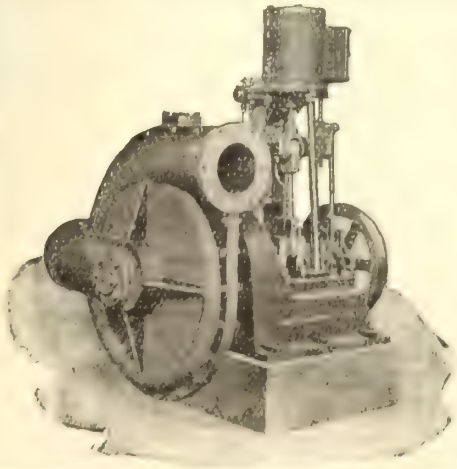
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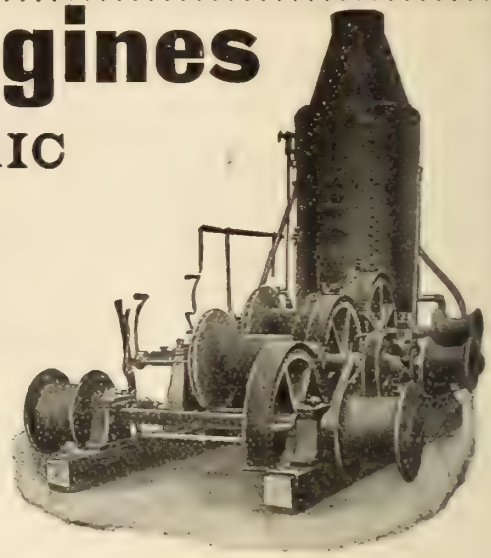
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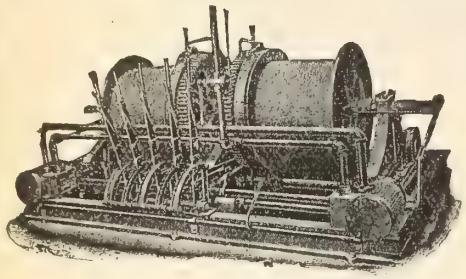
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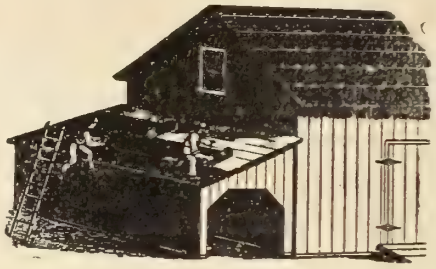
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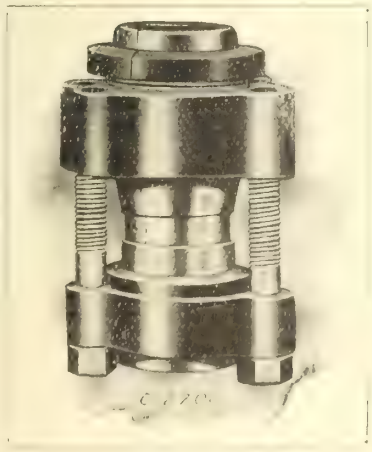
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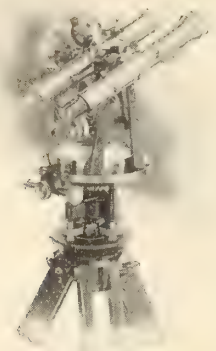


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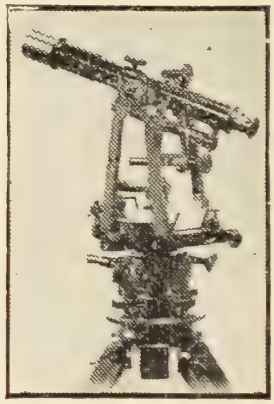
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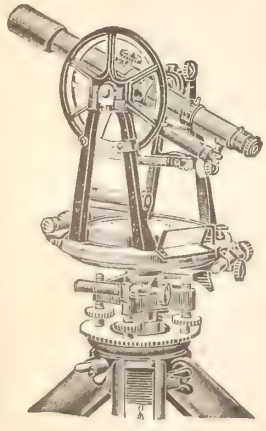
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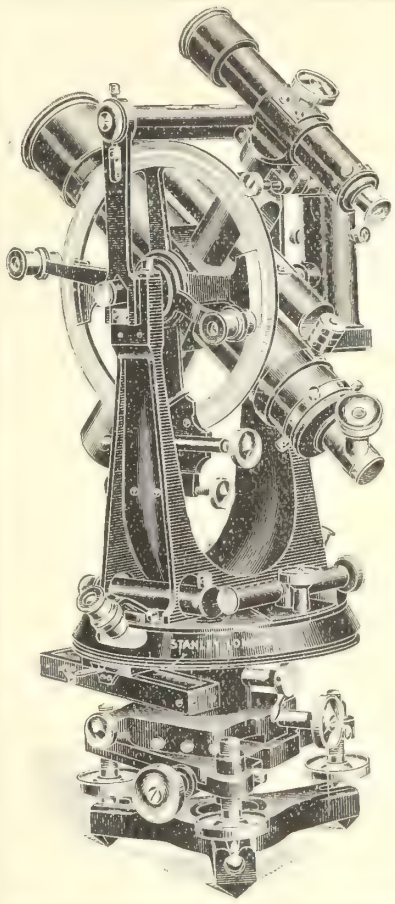
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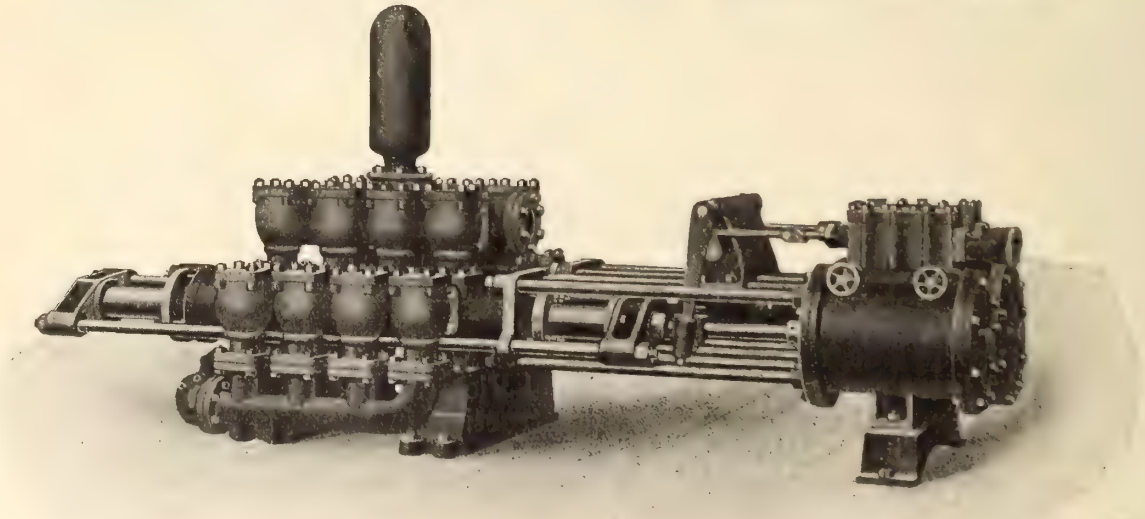
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THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

VOL. XXIX. TORONTO and MONTREAL, January 15, 1908 No. 22

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THE OLD YEAR AND THE NEW.

During the past twelve months the mining industries of Canada have not stood still. In the main there has been not inconsiderable expansion, more especially in Ontario and Alberta. But, quite as important as new growth, there has been a gradual strengthening of established enterprises. The adjustment of relations between mine operators and employees for definite periods, and the increasing use of arbitration in place of the wickedly wasteful strike have imparted a tone of stability to the mineral industries. In short, a firmer foundation has been laid for mining and metallurgy in the Dominion.

The financial depression, after reaching its zenith in December, has fortunately given way to easier conditions. At worst it was a transitory affliction. It has had the effect of weeding out unsound schemes. Although it has acted as a deterrent upon immediate development, it has also curtailed the efforts of stock-jobbers and promoters. Undoubtedly this is salutary. Therefore we may consider the scarcity of money as not altogether a hardship.

At any other period such a dehydration of stocks as has occurred within the last six months would have created a panic. But, in spite of the apparent imminence of a financial crisis, confidence in our ability to weather the storm has never been shaken. The tone of the press-writers has been uniformly optimistic and has been reflected by the country at large.

And this confidence is not founded upon fancy. It arises from a better knowledge of the vastness and availability of our material resources, from a growing faith in our own ability to use and conserve these resources and, not least, from the increasing sense of national unity and solidarity that is becoming a distinguishing mark of Canadians.

But the very vastness of Canada's natural wealth is at once cause of pride and of exceeding humility. We have but to look to the Mother Country to learn that we are yet in the first stages of development. And, glancing at other sister nations of the British Empire, we shall find many causes to blush at our sloth and inefficiency. Our southern neighbors may also be our instructors.

We take a good deal of pride in speaking of Canada as a "nation." But if Canada is to take her rightful place in the comity of nations she must be apt to learn. She must think and act imperially and not merely nationally.

THE DOMINION.

During 1907 every mining Province of the Dominion held its own and three, at least, showed new promise.

Nova Scotia's gold industry is just about where it was in 1906. In coal mining there have been large new activities, but a slightly decreased production. The acquisition of the Lingan areas by the Dominion Iron & Steel Company, and the purchase of the Gowrie and Blockhouse coal mines and lands by the North Atlantic Collieries, are perhaps the most noteworthy developments. Owing to labor trouble at Springhill the Cumberland Coal & Railway Company was shut out of the market for some months. In attempting to fill the gap several smaller collieries were given a better grip on life. There is very little of moment transpiring in the mining of other minerals.

At Lepreaux and Bathurst, in the Province of New Brunswick, iron ore deposits are being opened up by the Dominion Iron & Steel Company and by the Drummond Mines Company respectively. The Bathurst ore bodies are of unusual promise. It is easily conceivable that New Brunswick may, within the next few years, begin the production of iron and steel.

Quebec counts upon largely increased asbestos output for 1908. The selling price has gone up and the industry is in excellent shape. Chrome ore mining is giving encouraging results. Mica, ochre, copper and iron ore are the objects of less attention. But graphite is engaging capital and molybdenite may soon follow. Whilst the year 1907 has outshone 1906, it will in turn be eclipsed by the present year.

The Ontario districts of Cobalt, Sudbury, Thunder Bay and Rainy River have all been the scenes of increased activity during 1907. Public interest of course is more or less centered in Cobalt. Yet there are indications of a revival of silver mining in Western Ontario. The price of silver is, naturally, the controlling factor in the situation. However, improvements in methods and machinery, together with transportation facilities, have very materially lowered the point where profits begin.

Cobalt is rapidly approaching the stage when costs will be reduced to a business-like level. The past year has been a period of profound change and transition. Market manipulation and fraudulent promotions are, so far as the camp is concerned, almost things of the past. The labor difficulties were met and overcome by concerted action on the part of the operators. But the issue of the struggle might have been different were it not that public sympathy was with the operators. The wave of depression, bringing with it scarcity of employment, also helped to decide the dispute in favor of the operators. At present Cobalt is taking life very seriously. The output of the camp has grown by leaps and bounds. Concentrators, stamp mills and excellent power equipments are rapidly coming into commission. Three or four smelters at various distances, but all in Ontario, will gradually take care of a fair proportion of the ore. Cobalt is safely established.

The blowing-in of the Atikokan furnace at Port Arthur was a landmark of the past year. Other events that will influence the future of the Province were the visit of the American Institute of Mining Engineers and of several parties of British journalists. We may also class amongst the most important features of the year the inception of the anti-wildcat campaign by THE CANADIAN MINING JOURNAL. Public opinion has been aroused, Government assistance has not been sparingly given, and it is improbable that Ontario will again be the happy hunting ground of cheap fakirs.

Alberta, possessing at this moment twenty-eight producing coal mines, has merely touched the fringe of her limitless coal fields. The past year has witnessed active prospecting, development, and, lately, an extension of the market for the Province's output.

Saskatchewan owns and operates a coal mine of her own. Otherwise we hear very little about that Province's minerals.

British Columbia, whose estimated output shows a net increase of $4,636,625 over 1906, has made huge gains in coal production. The estimated increase in value of her coal output is $3,190,000—an almost startling figure when all conditions are considered. This increase will be even more marked during 1908, as the Crow's Nest Pass Coal Company is putting up equipment whereby its output will be doubled, and later in the year the C. P. R. coal mines at Hosmer will come into commission.

The increase in the value of the copper output was almost entirely due to the rise in price.

MINERAL COLLECTIONS—AN ANNOUNCEMENT.

On another page of this issue we publish the conditions and terms of Mr. J. B. Tyrrell's prize, offered for the best collection of Ontario minerals made during the current year.

As the prize is open to all Canadians, it is to be hoped that active interest will be displayed in this competition. The reward in itself is a substantial incentive to students and others. But the winner of the "Tyrrell Prize" will have the added satisfaction of having increased his own knowledge of an important science. We are sure that the response to this generous offer will justify the donor in continuing it from year to year.

THE YUKON—A CORRECTION.

In the *Engineering and Mining Journal* for January the 4th are two articles by Mr. J. B. Hutchins, which purport to give a review of the mining work in the Klondike during 1907. One is entitled "Klondike District" and the other "Gold Dredging in 1907." Both articles give very erroneous impressions of the work that

has been accomplished in that portion of Canada during the past year.

Mr. Hutchins was in the Klondike four or five years ago, and if he looked over the country at all he must know that there are very much more than 3,000 acres of so-called dredging ground. There is easily that extent of vacant ground in the flats of the Klondike valley alone, without counting the flats of its tributaries, such as Bonanza, Hunker and Bear Creeks, which will greatly extend these figures. Besides these areas there are extensive flats of gold-bearing gravel on Dominion Creek and its tributaries, which taken with those of the Klondike will raise the total number of acres to many times the area stated.

Part of this ground is acknowledged to be unfrozen, and therefore can be easily dredged. Mr. Hutchins, moreover, says in another place: "Were the alluvion of the Klondike Creeks unfrozen, dredging could be carried on at a large profit, for the other conditions are generally favorable to dredging. The gravel is fine, clean and of moderate depth. It generally rests on a favorable bed rock." But the text of his two elegiacs is contained in the sentence "the problem of dredging frozen ground is in a most discouraging state." One dredge is quoted as having given satisfactory returns, but three other powerful dredges from which returns were not available are stated to "have been very disappointing in return."

The dredge above spoken of is doubtless the large dredge which has been working for three seasons on the flats in the Klondike valley, near the mouth of Bear Creek. Nothing is said of the small Ridson dredge, which was working on and near Discovery claim on Bonanza Creek, and which has already extracted gold to the value of a million and a quarter dollars out of three worked-out mining claims.

The Bonanza basin dredge was working near the mouth of the Klondike River in 1906 with great success, as stated by Mr. McConnell, the Canadian Geologist, in the report of that year. But last year it was decided to alter this dredge, remove its steam boilers and machinery and replace them with electric motors. These alterations were not completed until the first of September, after which date it was operated with marked success until the 17th of October.

The three dredges referred to by Mr. Hutchins were located on the lower portion of the valley of Bonanza Creek. Nothing is known of the results obtained by them; but another dredge has been built near them by the same company that owns these three dredges, and it will be ready to begin operations next spring. Three more large dredges have also been built by the same company on Hunker Creek, and they too will be ready to begin work in the spring. These seven dredges are all to be operated from one central electric station, and it is yet much too early to say either that they have not or that they cannot be worked successfully.

Four other dredges also began operations on Forty Mile River, one in Canadian and three in American territory, and, while no information has been made public as to the results so far obtained, even if they did not make much money this year it is but reasonable to give them a little time to become adapted to local conditions. It is well known that the Pioneer dredge of the Klondike, which finally proved so successful on Discovery Claim on Bonanza Creek, was at first an expensive experiment.

Besides the dredges above enumerated, which have been already installed, the N. A. T. & T. Company is preparing the ground in the valley of Miller Creek, in order to be able to put dredges on it in the near future, by stripping the moss and muck from off the gravel by the use of water under hydraulic pressure.

In this connection it would be interesting to know exactly where the thawing of ground by stripping it of its covering of moss and muck has proved a failure. For, in spite of Mr. Hutchins' statement, the exact reverse is the case, as was long ago shown by Messrs. McConnell and others who are thoroughly familiar with that country, and as may now be seen at many places in the Klondike. The thawing of gravel to a depth of 12 or 15 feet, such as seen in many of the open cuts which are often sunk to bed rocks in a very few weeks, cannot be correctly referred to as "progressive seasonal thawing," as Mr. Hutchins speaks of it.

Exactly what is meant by frozen gravel being below the level of "ground-water" is not clear, but the clean use of geological terms can hardly be looked for in an article where "Poverty Bar," which is a distinct terrace, is spoken of as a peneplain. For this latter term, which means a base-levelled plain of erosion, is about as far removed from a terrace as two physiographic features can be.

In regard to the length of the season for work the extraordinary statement is made that the average night temperature on the first of May and on the 15th of October is fifteen below zero F. People who believe this statement will doubtless be prepared to believe that the country is too cold either to mine or to live in.

No papers are more interesting to miners or investors in mines than careful reviews of the work of the year, and consequently none can do more harm than such papers as these, filled with inaccurate statements and backed by the name of a great mining paper such as the *Engineering and Mining Journal.*

CANADIAN SILVER.

The shipment of a quarter of a million ounces of bar silver from the Trail refinery of the Consolidated Mining & Smelting Company to the Canadian Mint at Ottawa is a significant event.

Remembering the reports, industriously circulated some months ago, to the effect that no silver of sufficient purity for use in the Mint was produced in Canada, it is gratifying to note that the Trail silver is 999 fine. Thus,

not only does this metal meet the requirements of the Mint, but it is more than ordinarily free from alloys.

The Mint is now in operation, and we predict that not the least distinguishing feature of Canada's history in 1908 will be the fact that Canadian silver is being mined, smelted, refined and coined by Canadians in Canada.

"HIGHLAND MARY."

In this season of annual returns and estimates it is hard to give up space to the admirable Mr. Law or to the retiring Russell. Yet, as many of our readers are awaiting news, a prapagraph must be spared.

Law now awaits jury trial. He is charged by the Crown with conspiring to defraud. His bail was fixed at $20,000. As Assistant Crown Attorney Price pointed out, Law and his confreres have milked the country of about $300,000. The evidence adduced in the preliminary Police Court hearing was of a nature so damaging that a much higher bail would not have been amiss.

Amongst other evidences of fraud was the sworn testimony of the mining engineer employed to superintend work on the "Blue Bell" claims. Law & Company publicly announced that Blue Bell assays ran from $200 to $20,000 to the ton. Their engineer swore that he had only made two assays that showed gold at all. One of these was reported as showing $2.50 to the ton, and the other $1.50 to the ton.

This instance is typical. It were profitless to mention others. One incident, however, is interesting. It developed during the conspiracy trial, that the "Ontario Mining News" owed its existence to Law & Company. On one occasion Russell took 10,000 copies of that sympathetic sheet to England with him.

So much then for the conspiracy case. Law & Company stand disgraced and dishonored.

The Companies' Act case is still dragging along. It served a very useful purpose in eliciting evidence sufficient to prompt the Crown to prosecute Law for fraud.

Russell, Law's very silent partner, is reported to be in Lima, Ohio.

PROFESSIONAL SERVICES.

Enquiries reach this office every day from all parts of Canada as to the merits of particular mines. It is obviously out of the question for THE CANADIAN MINING JOURNAL to attempt to answer these questions.

To formulate a reliable opinion of a mine it is necessary to visit and inspect that mine. This costs money and can only be adequately done by a trained mining engineer.

The holders of small interests in mining properties are often unable or unwilling to stand the expense of engaging an engineer to get information for them. But, often also they are unable to get satisfactory information from the officials of the company.

When this is the case there is a remedy. If a group of shareholders, whose holdings represent at least one-fifth in value of the total stock, arrange to act together they can secure from the courts the right to have the mine examined and reported upon. The expense of engaging a properly qualified man will then fall lightly upon many shoulders; or may, under certain circumstances, be referred to the company itself.

THE CANADIAN MINING JOURNAL will be glad to assist and advise any persons who find themselves unable to obtain information. Finally, it is necessary first of all that these persons help themselves. But we shall willingly help persons interested in the same mine to come together.

WARNING.

In the Toronto newspapers there has appeared of late a copious advertisement. One L. W. Spear invites the singed, but forgetful, public to join him in an effort to develop groups of mines in various districts.

We notice that Mr. J. F. Lennox, barrister, of Toronto, is vice-president. Mr. Lennox's name was associated with the Larder Lake Proprietary Gold Fields. Last autumn a number of this company's employees were met on the way out from Larder Lake. They claimed that they had not been paid for some months and that they had not been decently fed. The JOURNAL mentioned the circumstance at the time.

In cases like these a reputable officer of a company resigns or demands and receives an explanation.

Taking Mr. Lennox then as a sample of those associated in this scheme, Spear's Canadian Mines Development, we rise to remark that Mr. Lennox must clear his name of several smirches before he has any right to appeal to the public for money. For instance, he might tell us something of Silver Bird and its aerial flight.

Further, the mining proposition that needs a large fraction of a page of newspaper space where to spread its is already damned.

Referring again to the advertisement, we notice that the promoters of this co-operative plan recognize that guady language is no longer desirable. It would, mayhap, be as salt upon the wounds of those who have gone in for "permanent" investments of the Silver Bird variety. Realizing this, Mr. Spears delivers himself in tones dulcet and moderate, but insistent. His is an appeal to reason, not a play upon the sinful thirst for shekels. And yet we must (were we not requested to by Mr. Lennox and others last winter?) watch Silver Bird!

The possible investor must bear in mind the fact that in putting his money into heavily advertised mining schemes he is not merely purchasing problematical mining shares, but is buying an interest in a large advertising debit account, running up to thousands of dollars and chargeable in all cases, directly or indirectly, to capital outlay.

PRESENT STATUS OF TECHNICAL EDUCATION IN NOVA SCOTIA.

By F. H. Sexton, Director of Technical Education for Nova Scotia.

Technical education in Nova Scotia is at present only seven months old and has as yet created no history for itself. The alacrity with which many men have taken advantage of the simpler foundation courses offered this year in the Technical Schools established at Halifax, New Glasgow and Sydney augurs well for the future of this department of education. It was on April 25th, 1907, that the Provincial Legislature of Nova Scotia passed an "Act Relating to Technical Education." This made the people of this province the first in Canada to accept the conclusive lessons taught by Germany and other nations in the efficacy and necessity of this form of education to the material extent that they were willing to establish a system of technical instruction on a comprehensive basis which could be enlarged to meet future demands.

This Act provided for a technical college to be built in the capital city, which would be the capping stone of the system. In the words of the Act: "There shall be established at Halifax, an institution for the purpose of affording facilities for scientific research and instruction and professional training in civil mining, mechanical, chemical, metallurgical and electrical engineering, or any other departments which may from time to time be added.

In order to articulate the work of this institution most closely with the other colleges already existing in the province, a member from each of these colleges and one from Mount Allison University, New Brunswick, which draws its students to a great extent from Nova Scotia, are nominated to the Governing Board.

The plans for the main building of the Technical College have been completed and a cut of the front elevation is given on the cover of The Journal.

The building is designed in a free Renaissance style of architecture. It is to be constructed of Nova Scotia pressed brick and freestone. The central part of the structure is to be composed entirely of stone and by projecting from the main part of the building will serve to relieve the impression of flatness to which it might otherwise be prone. The building will consist of two stories and will be 170 feet by 48 feet, with two projecting wings in the rear, each 40 x 55. The Provincial Science Library, which now represents a handsome nucleus of valuable accessions and the Provincial Museum are to be given a home in this College. This arrangement will prove an advantage to all the departments, because it will give the Library and Museum a chance to expand into their full spheres of utility, and will place the scientific volumes of the former and the large number of mineralogical and geological specimens of the latter at close hand for purposes on instruction.

The plans for the building are finished and are shortly to be put out for tenders, so that construction may begin with the disappearance of frost in the spring.

Besides the full engineering courses in the Technical College, it is the present intention to hold a number of shorter courses in the different branches, which will be suitable for men in practical life, who wish to obtain a higher theoretical knowledge of the scientific basis of the profession in which they are employed, but who lack all the necessary preliminary knowledge to be regular matriculants in the College, or who are prevented by one reason or another from giving up the full number of years required to obtain an engineering degree.

There are to be two laboratory buildings in the rear of the main building, one devoted to Mining and Metallurgy and the other to mechanical engineering, electrical engineering, hydraulics and strength of materials. The buildings are to be of the factory type of reinforced concrete and steel, so that they can be readily enlarged at any time.

Since the coal industry is the greatest one of which the province boasts, the mining laboratory is to be equipped for research and instruction in this branch of mining industry as well as metal mining. Almost all the mining engineering laboratories in America with a few notable exceptions have equipped themselves to carry out the operations connected with metal mining and ore dressing and have neglected the other branch of the industry. Research problems of such nature as are vital to the industrial progress of the province will be carried out in the various laboratories, and it is hoped that the closest relationship may exist between the industries and the Technical College.

The fees for tuition at this Government Institution will be nominal and everything will be done to encourage the poor boy who desires a higher scientific training, but who is prevented from going abroad to obtain it, on account of the attendant expense.

Under the Technical Education Act there is also provision for secondary education by continuing under the new Department of Technical Education the coal mining and engineering schools which have heretofore existed under the Department of Mines and also by establishing in industrial centres "Local Technical Schools."

The coal mining schools are conducted for coal miners and coal mining officials, who wish to acquire a greater knowledge of the science and art of coal mining and for those who wish to procure the Government certificates of competency for managers, under-ground managers and over-men. For educational purposes, the portions of the province which contain the collieries have been divided into five districts and an instructor is appointed who devotes his whole time to teaching coal mining and surveying in that district. Classes are held at almost every colliery centre and all instruction is absolutely free to the students. In the districts that are so large that the regular instructor cannot overtake the work, local assistants are appointed to aid him. At the present writing there are 18 coal mining schools in operation.

As the coal mines grow larger and deeper and call for more and more economical working in the face of increased engineering and commercial complexities, the educated miner will be more and more necessary to carry on the work successfully and to make the requisite provisions for guarding human life. These coal mining schools, which are being brought to a higher standard each year, will be a great boon to ambitious men by providing a practical education at their doors and will also serve in supplying educated mine officials to superintend the collieries.

The engineering schools, of which there are 15 at present, are instituted in every colliery centre where enough students make application to warrant the necessary expenditure. These schools are established for the purpose of instructing the men who operate the machinery about the collieries in the principles of steam and mechanical engineering, so that they may possess themselves of the theory of these branches and be enabled, if they wish, to obtain Government certificates of competency at 1st, 2nd, 3rd or 4th class stationary engineers.

A general educational standard is required for entrance into the coal mining and engineering schools, and preparatory classes in mathematics and English composition are held in every locality where the coal mining and engineering schools exist. Thus no ambitious man who has to earn his livelihood is withheld from securing such a practical education as will enhance his position and secure promotion.

The proviso for "Local Technical Schools" in the Act reads as follows:—

N. S. Laws, Chap. 1, sec. 13: "The Governor-in-Council may from time to time establish, in such places as it may be deemed advisable, local technical schools to furnish industrial education of such character and extent as will most effectively meet the requirements of the population and industries of the locality."

These local technical schools are supported both by the province and the locality, each sharing nearly equally in the financial burden. This year three industrial centres, Halifax, Sydney and New Glasgow have responded with alacrity and have established schools of this character. In the three, the enrollment has exceeded 400 and the average attendance for the first two months is above 70 per cent. The classes offered this year are as follows: Business English, Technical Arithmetic, Practical Algebra and Geometry, Mechanical Drawing, Machine Drawing, Architectural Drawing, Elementary Electricity and Magnetism, Mechanism, Surveying and Plotting, and Chemistry.

The courses are practically free, a deposit of $2.00 to $4.50 being required on entrance to any class, and this amount being refunded at the end of the term according to each student's attendance. The classes are open to everybody who has the necessary knowledge to enter the class which he desires to attend. It is hoped that there will be a goodly number next year from those receiving instruction in these foundation courses at present, who will wish to pursue their studies further and thus form a warranty for offering classes of more advanced grades.

Several other industrial centres than the ones named have intimated their desire of participating in the scheme of local technical schools, and next year a number of the progressive towns will have schools offering such pratical instruction in mathematics, drawing, etc., as well be best suited for the men employed in the local industries.

Nova Scotia has provided for a system of Technical Education which can be expanded from the present working basis to supply practical and industrial and engineering instruction from the lowest to the highest grade. This will train the native born to operate native industries and to develop the natural resources of this section of Canada to the utmost. In putting the actual machinery of the system in operation, the Government is proceeding cautiously and conservatively, but it intends to provide for technical education throughout the province, where it can be so advantageously offered as to warrant the expense for its establishment.

MINING IN QUEBEC IN 1907.

By J. Obalski.

The mining industry in Quebec is characterized by its steady development and so far it has been free from the erratic movements which follow upon fresh discoveries.

For the study of this subject, we may divide the Province into two sections:—

1. The old settled districts of the Eastern Townships and the valley of the St. Lawrence and Ottawa Rivers.

2. The new districts in the North.

I.

In the Eastern Townships the leading industry is asbestos, which has been flourishing so far. There are thirteen companies operating at Wolfestown, Black Lake, Thetford, East Broughton and Danville, which employ about 2,500 men, and have been producing regularly. The output for 1907 is expected to be 25 per cent. higher than in 1906. It should be added that the selling price has considerably increased, especially for the crude varieties; it now reaches close on $300 per ton for the first class and $200 for the second, while the price for fibre varies from $15 to $100, according to grade. The fibre is now in great demand owing to the new use made of it for the manufacture of boards, and this has led to the opening up of new mines and the erection of new mills at East Broughton, which district is mostly a fibre producer. A new mill has been started during the year and two others are in course of construction at the same place. A mill has also been erected at Colraine, but it has been working only a few months.

In Bolton, near Eastman, a body of asbestos-bearing serpentine has been developed on quite a large scale, this district being an entirely new one.

There was practically nothing done in the Ottawa region, where a fine quality of asbestos—but rather scarce—exists.

The asbestos industry is now a permanent one; the mines are well equipped with proper plant, the result of twenty-five years of experience of men who have made that industry their career and have created it here.

The Shawinigan Power Company has established a main line carrying 50,000 volts, which divides its power among the various mines to the extent of over 6,000 horse-power.

The proximity of the railway makes the transportation question a very simple one, while labor is both plentiful and good.

Practically all the mines are yielding good returns to their operators.

The Chrome mines found in the serpentine belt in the Township of Colraine are now worked on more scientific methods. During the year diamond drilling has been resorted to for the purpose of proving the existence of ore bodies at a greater depth than the quarries previously worked, and, as a result of such

diamond drilling, the Black Lake Asbestos & Chrome Company is sinking a 300 foot shaft on this property.

Three companies have been operating for chrome, and the output will compare favorably with that of last year. Some parties, consisting of a few persons, have also been working on a small scale. The concentrating of the low grade material is now successfully effected by means of stamp milling, followed by the use of Wilfley tables. About 100 men are employed in this industry, and there are 45 stamps in all at the four mines, producing about 8,000 tons.

There is nothing special to report regarding the iron industry, which is represented by a charcoal blast furnace at Radnor and by two at Drummondville, all three using mostly bog ore.

Experiments are still being made in connection with the treatment of the magnetite sands of the Gulf of St. Lawrence, chiefly by means of electricity; but, so far, no definite result has been obtained.

The same remark applies to the treatment of titaniferous ore.

Ochre is worked at St. Malo, in the vicinity of Three Rivers, by three different parties, and is shipped in the calcined form to the amount of about 3,000 tons.

Low grade copper ore is shipped as usual from two mines at Capelton, near Sherbrooke. The ore is used for making sulphuric acid and some value is added by its contents in silver and copper. The Nichols Chemical Company uses some of the ore on the spot, the balance being shipped to the United States. The Eustis Company has its mine run by electricity and is operating a concentrating plant consisting of crushers, collars and Wilfley tables. The output is about 30,000 tons yearly.

Some other prospects have been carried on in connection with copper ore in the same district, among which may be mentioned the Ascot mine and a group of properties developed by Mr. A. O. Norton. The latter is quite important and will probably lead to the making of a valuable mine, as the ore found compares favorably with that got out at Capelton in about the same geological conditions.

Some prospecting for galena has been done at Gaspe Bay, and for galena and zinc blend on Calumet Island (Pontiac County), but so far no shipments have been made.

Practically nothing has been done in connection with the alluvial gold of the Eastern Townships, but the discovery of a small deposit of gold-bearing quartz in Marston, near Lake Megantic, is worth recording. It is the first time in the history of that district that gold has been found in quartz in apparently commercial quantity. Of course the discovery is a fresh one, and we do not know how the prospect will turn out, but it is presumed that further prospecting will be carried on next summer, which may also call attention to the valuable placers formerly worked in the Chaudiere valley and in Ditton.

In the Ottawa district the only activity manifested has been in connection with amber mica, the main producing mine of which has been that of Blackburn Brothers, near Perkins' mill in Templeton. A good many small producers are taking out some mica which is used by large concerns in Ottawa, which city remains the centre of that industry. Mica is shipped in the form of thumb-trimmed and split and is also prepared in large sheets under the name of "Micanite." The value of the material shipped may represent about $200,000.

A company has also reopened two old white mica mines at Maisonneuve (Berthier County) and near Murray Bay (Charlevoix County), which also contain some rare earths, but no output of any importance has yet been reported.

Several companies have been organized for working the graphite deposits of Buckingham, Calumet and St. Jovite. Mills have been erected or fitted up anew, and it is proposed to establish others, but the difficulty of concentration has retarded the development of this industry.

Little or no work has been done in connection with molybdenite, phosphate, feldspar or baryta.

In the Three Rivers district some wells have been bored for natural gas, which is conveyed by lines of pipes to that city and some of the neighboring villages.

The manufacture of Portland cement at Hull has been a success, and the output is to be increased still more.

The getting out and manufacture of building materials are progressing proportionately to the development of the country.

II.

The Districts in the North.

The new mining districts of the Province comprise the unsurveyed portion of the northern territory of the country of Pontiac, east of the Province of Ontario, and the Chibogomo region. Both are included in the Huronian belt running from Lakes Superior and Huron to Lake Mistassini.

The former region, owing to its proximity to Cobalt, led to the conception of great hopes which so far have been but slightly realized. In fact, the explorations of the Geological Survey and the Quebec Government as well as the many prospects carried on by private individuals, have led to the discovery of very little beyond the existence of rocks of that Huronian formation, in which, however, one must not despair of finding economic minerals. Up to now, a little gold-bearing quartz and copper ores have been found disseminated in quartz veins in the vicinity of Lake Opasatica and near the Ontario boundary. It is also worthy of note that the formation in which gold is found is comparable to that of Larder Lake.

In a westerly direction, molybdenite has been found at several points, amongst others on the Keewagama River, where it is fairly abundant and where bismuth also has been observed.

Further on, on the Harricanaw River and on the Bell River, a little copper has been found.

In the surveyed townships east of Lake Temiscamingue a little Cobalt ore has been discovered, but not as yet in commercial quantites and the presence of silver in it is not yet fully confirmed.

The Chibogomo district is more important, but, as it is situated 200 miles from a railway and is difficult of access, no operations can be carried on there until a railway is built. The last prospects have led to the discovery of considerable deposits of copper, of good grade, yielding values of gold, of mispickel iron gold-bearing quartz, of iron pyrite, of magnetic iron and of asbestos, the whole in commercial quantities. Moreover, a slate conglomerate formation, similar to that of Cobalt, has been found and, in some parts of the same, Cobalt bloom, which leads to the hope that other more important discoveries will be made.

The explorations of the Geological Survey, of the Quebec Government and of private companies have established the value of that district.

To sum up, the year 1907 has been a good one in the Province of Quebec and it is probable that the total output will be greater than last year's.

MINERAL PRODUCTION OF BRITISH COLUMBIA IN 1907.

By E. Jacobs.*

The official estimate of the approximate total mineral production of British Columbia for the year 1907 exhibits an increase over that of 1906 of $758,437. The Provincial Mineralogist's published figures show production as under:—

	Quantity.	Value.
Gold, placer		$ 700,000
Gold, lode ..oz.	199,770	4,129,246
Total gold		$ 4,829,246
Silver ..oz.	2,940,190	1,852,320
Lead ..lb.	48,309,660	2,318,864
Copper ..lb.	38,392,264	7,678,453
Total metalliferous		$16,678,883
Coal (tons of 2,240 lbs)	1,856,600	6,498,100
Coke (tons of 2,240 lbs)	227,000	1,362,000
Other minerals (building materials, etc.)		1,200,000
Total production in 1907		$25,738,983

In arriving at the approximate value of the several metals as shown above, the average market prices for the year, as published in the *Engineering and Mining Journal,* have been taken, with a deduction of 5 per cent. off the price of silver and 10 per cent. off that of lead. For coal and coke what was considered a fair market value in British Columbia was taken. Accordingly the respective prices were as follows: Lode gold, $20.67 per oz.; silver (net), 63 cents per oz.; lead (net), 4.8 cents per lb.; copper, 20 cents per lb.; coal, $3.50 per long ton, and coke, $6 per long ton.

For purposes of comparison the following table, showing production over a period of two years, is submitted:—

Comparative Table Showing Quantity and Value of Mineral Products for Two Years, 1906-1907 (last year estimated).

	1906.		1907.	
	Quantity.	Value.	Quantity.	Value.
Gold, placer ..oz.	.....	$ 948,400	.....	$ 700,000
Gold, lode ..oz.	224,027	4,630,639	199,770	4,129,246
Total gold		$ 5,579,039		$ 4,829,246
Silver ..oz.	2,990,262	1,897,320	2,940,190	1,852,320
Lead, ..lb.	52,408,217	2,667,578	48,309,660	2,318,864
Copper ..lb.	42,990,488	8,288,565	38,392,264	7,678,453
Total metalliferous		$18,432,502		$16,678,883
Coal (tons 2,240 lbs.)	1,517,303	4,551,909	1,856,600	6,498,100
Coke (tons 2,240 lbs.)	199,227	996,135	227,000	1,362,000
Other minerals (building materials, etc)		1,000,000		1,200,000
Total production		$24,980,546		$25,738,983

The approximate total value of the production of metalliferous minerals in 1907 was, with the exception of that of 1906, the largest in the history of metal mining in the Province. As compared with 1906, though, there was a decrease of $1,753,619. This loss was, however, more than compensated for in the considerable increase in the production of non-metalliferous minerals, chiefly coal, although coke contributed $366,000 and building materials, etc., $200,000, of this increase, the balance $1,946,000) representing the proportion from coal.

Taking the various minerals separately, as shown respectively in the tables of production, the following comments are made:—

Gold.

As already mentioned, the production of placer gold in 1907 was smaller than in any other year since 1898, and this notwithstanding that water conditions seemed, early in the season, to promise a favourable year for hydraulicking. It is possible that the revised figures, when the official returns shall all have been received, will prove the estimate now published to have been too low, yet while some gain may be made it is unlikely it will be sufficiently large to bring last season's production up to that of 1906. The districts which produce most placer gold in the Province are Cariboo and Cassiar. In the former Quesnel division had the assistance of a property taken over two years ago by a Guggenheim company which recovered about $20,000 against nothing for 1906, while the Cariboo division was understood to have had several properties at work that had been idle several previous seasons, yet the preliminary advices record a total decrease of about $150,000 in the total recovery throughout both divisions of this district. Atlin camp, for years the largest contributor of placed gold in British Columbia, is also reported to have made a smaller production than during any one of the three immediately preceding years—1904-1906—its decrease being shown as approximately $100,000 The production of individual miners from Atlin creeks has been steadily becoming smaller for several years, yet it was expected that the operations of the Ruffner, Hamshaw, Guggenheim and other companies would have in the 1907 season more

*Editor *British Columbia Mining Record.*

than made up for such loss. It is understood that the creek gravels suitable for hydraulicking are by no means exhausted, so that given favorable conditions for working them returns may be expected to show a substantial increase next season. Dredge mining in this camp has proved a failure, and has been abandoned for the time. Possibly it may be tried again later; if so it should be by men thoroughly experienced in that class of mining.

The $500,000 decrease in the value of lode gold was due to the smaller production of the Boundary and West Kootenay districts, and chiefly owing to a suspension of mining and smelting operations during two to three months of the year. The bigger gold-quartz mines of the Province did not contribute nearly so large a proportion of the total as might reasonably have been looked for. In fact the only one that made anything like a fair showing was the Nickel Plate in the Lower Similkameen, with a production estimated at between $400,000 and $500,000. In Nelson mining division the Ymir mine made a poor showing as compared with its production of several years ago. On the other hand the Queen, Second Relief, Kootenay Belle and Arlington, all in the Salmo-Erie section of this division, together produced between $200,000 and $300,000, and the Fern and Granite, both within a few miles of Nelson, also added to the total. In the northern Lardeau, the Eva mine, near Camborne, was the only gold mine that made a production worthy of mention.

Silver.

The production of silver was practically the same as that of 1906—not quite 3,000,000 oz. In round figures, West Kootenay produced about 1,300,000 oz., East Kootenay 950,000 oz., Boundary something like 600,000 oz., and the Coast district about 80,000 oz. While the decrease in quantity was not considerable, the expectation was that the change would be the other way, since in Lardeau district the Silver Cup mine made an appreciably large increase over its 1906 output, in Ainsworth several mines together did similarly, and in the Slocan and Whitewater in the camp of that name, and the Rambler-Cariboo, Standard, Hewitt, Vancouver group, and Arlington, among others, all made a higher production than in the year immediately preceding. These gains, however, were insufficient to offset the decreases in East Kootenay and the Boundary. It is pleasing to note that there is believed to have been a distinct improvement in the Slocan, which is a change for the better not generally known to have taken place.

(To be continued.)

THE SIXTEENTH ANNUAL REPORT OF THE ONTARIO BUREAU OF MINES.

(Continued from last issue.)

Oil and Gas in Kent.

The country in which lie the Romney and Tilbury oil fields is covered with drift. It is thus doubly unfortunate that full records of the data regarding underlying formations have not been kept during the sinking of the wells.

In 1905 the Bothwell field was producing some 6,000 barrels of oil per month. This was the first and for some time the only producer. In March, 1907, there were 150 wells drilled in Tilbury, of which only 4 were dry. On July 1st the number of producing wells was 235. There were also 33 dry holes and 26 new wells being drilled. In the Romney pool, at the same date, there were 47 wells, of which 24 were dry. The production of oil from the Tilbury and Romney field is given by the Imperial Oil Company of Sarnia, who purchase the entire flow, as follows:—

East Tilbury—

No. of bbls. of 35 gallons from Dec., 1905, to end of June, 1906	4,000
July	4,315
August	13,897
September	14,651
October	23,679
November	26,558
December	28,101
1907.	
January	29,172
February	26,098
March	29,600
April	31,055
May	35,004
June	35,654

Romney, 1907—	Bbls.
January	2,871
February	5,939
March	11,104
April	9,685
May	5,534
June	3,163

The Romney field is handicapped by lack of water for boilers. Also it has little natural gas. Gas is to be piped from Tilbury.

The total oil produced in Toronto in the first six months of 1907 was slightly more than 400,000 bbls. Of this the Tilbury and Romney fields produced more than half.

The Sarnia refinery has a capacity of 75,000 bbls. per month. It is worked to full capacity, and any falling off in Ontario's production is made good by importation from the United States.

In July last Tilbury crude oil brought the operator $1.16 per bbl.; Romney oil, 84 cents per bbl. In addition to this there is a Government bounty of 52 1-2 cents per bbl. Including United States producers, the price per bbl. ranges from 28 cents to $1.68 1-2. The latter figures includes bounty.

The color of the Tilbury oil in bulk is a dark green olive. In thin layers it assume a pale yellow shade. It is 38 degree to 41 degrees Beaumé.

The Romney oil, described by refiners as "dead," contains a high percentage of sulphur. A small quantity of naphtha is extracted from it and the balance is sold as fuel. It is about 28 degrees to 30 degrees Beaumé.

There are several important gas wells in East Tilbury and Raleigh. During May and June, 1907, the City of Chatham drew its whole suply of natural gas from one well on the David Halliday farm in the northwest part of lot 1, in the sixth concession of Raleigh. The well is 1,421 feet deep. Gas was struck at 1,417 feet. It is lined with 3 inch tubing, and packed with a dresser packed. It was closed in on September 16th, 1906. The gas is conveyed 10 miles to Chatham in a surface pipe 3 inches in diameter. This is to be replaced by a 6 inch pipe. The rock pressure of the gas is said to have decreased to 460 lbs. to the square inch, but when first measured it was 650 lbs. It is conveyed to the city at a pressure of 200 lbs., when it is reduced to 60 lbs. At the Chatham Gas Company's works it is further reduced to 6 ounces, at which pressure it is delivered to the consumers.

Another well on lot 14, Middle road north, East Tilbury, gives 500,000 cubic feet per day. This will be used to supplement the Chatham supply.

The Chatham prices per 1,000 cubic feet range from a maximum of 35 cents down to 12 cents, according to quantity used. For domestic lighting and cooking it is 35 cents. For heating it is 27 cents per 1,000 for the first 100,000 cubic feet. For the next 50,000 the price is reduced to 27 cents. For any quantity over 150,000 the rate is 17 cents. For gas engine power the minimum charge is $37.50 per month on the assumption that not less than $250,000 feet per month will be used, which is at the rate of 15 cents per 1,000. Used under boilers the rate is 12 cents per 1,000 for any quantity. Artificial gas was formerly sold in Chatham at $2.50 per 1,000, with a discount of 30 per cent. for cash within 10 days. Nearly every farmer along the gas pipe line into Chatham now uses gas for lighting.

The Chatham Gas Company is preparing to purify the gas by removing the sulphuretted hydrogen.

Two other gas wells supply the adjacent country.

In the Romney field oil is struck at 300 feet. There are no gas wells proper. During the summer the largest oil producer was the Hornick Farm Oil Company, whose output was 100 bbls. per day.

Handling the Oil in Tilbury.—The oil is first piped from the different wells on a farm into one or two tanks. Thence to a large central station; and then to the railway station tank at Merlin. Pipe lines have been installed to carry the oil from the wells to the central storage tanks and pumping station. The main tank is of steel and has a capacity of 3,840 bbls. Other tanks bring the total capacity up to 6,000 bbls. The oil is conveyed in two pipe lines, 4 inch and 2 inch, to Merlin, four and one-half miles, under 200 to 400 lbs. pressure. As much as 3,500 bbls. can be sent in ten hours. At Merlin the oil flows by gravity into the cars.

One one farm there were nine producing wells. The power for pumping is supplied by a gas engine run by natural gas. The power plant is placed in a central position. Surface rods run to each well, at which a pump is placed. The pumps are run simultaneously by these rods. The local tanks usually have a capacity of 250 bbls.

Drilling is contracted for at rates of from 85 cents to $1 per foot in Tilbury. Most of the wells are about 1,400 feet deep. Shooting with nitro-glycerine entails an additional cost of about $175. The cost of lining brings the total outlay to about $3,000. If the well proves a "duster" the casing is removed and the operator loses. Twenty-five days are usually taken to drill a well in Tilbury. In the Romney district the shallow wells are drilled with much less outlay.

(To be continued.)

ONTARIO'S MINING PROGRESS IN THE LAST DECADE.

By Phillips Thompson.

In no respect has the industrial expansion of the Province of Ontario during the last decade been more apparent than in connection with its mining and metallurgical activities. Owing to the discovery of new mineral deposits and the investment of large amounts of capital in mining and metallic industries, the increase in production has been considerably greater than in any other department of industry. Especially is this true of the later portion of the period under consideration. In 1897 the total mineral output was valued at $3,899,821, of which only $1,038,089 was metallic. Up to that time, and for some years later by far the larger proportion of mineral production consisted of non-metallic items, including building stone, brick, lime, etc. In 1901(however, the metallic output had increased to $5,016,734, or 42 per cent. of the total production, and in 1905, for the first time, the metallic exceeded the non-metallic output, being $10,201,010, out of a total production of $17,854,-296. This figure, which was the highest record in the history of Ontario mining, was considerably surpassed in 1906, with a metallic production of $13,179,162 and a non-metallic output of $9,042,646, making a total of $22,-221,808. Partial returns, covering the first nine months of 1907, indicate that the advance has been continuous.

With the exception of pig iron, silver holds the first place on the list of metals. Prior to the development of the Cobalt deposits its production had for some years been declining. A drop in the price of the metal resulted in the closing down of mines formerly large producers in the Port Arthur district. The output in 1902 had decreased to $58,000 in value, and in 1903 to $8,949. The discovery of the silver-cobalt nickel ores in the fall of 1903 in the course of construction work on the Temiskaming & Northern Ontario soon attracted widespread attention from mining men and capitalists, and a rush of prospectors to the new camp took place during that and the following year. Practical mining operations were speedily set on foot, the output of the camp for 1904 being 158 tons of ore, yielding in addition to other values 206,875 ounces of silver, valued at $111,887. This year witnessed the beginning of operations on the Nipissing, La Rose, McKinley-Darragh, Trethewey, Coniagas and other prominent mines. During 1905 the number of shipping mines was increased to 16. The total production of silver for the year was 2,473,452 ounces, valued at $1,372,877. The output was entirely from the Cobalt field, with the exception of small quantities extracted from the residues of the Copper Cliff nickel mattes. This was more than doubled in 1906, the yield having risen to 5,357,830 ounces, valued at $3,543,089, with additional values of cobalt 312 tons, $30,819; nickel, 156 tons, and arsenic 1,558 tons. A great drawback to Cobalt mining operation has been the difficulty of obtaining satisfactory terms from the American smelters. At first they were paid for the subsidiary products, but latterly the smelting companies, alleging the refractory character of the ore, have as a rule refused to make any allowance for the nickel, cobalt and arsenic contents. Other difficulties arising out of fluctuations in the price of silver have occurred more recently as a result of which shipments have been to some extent kept back, with a view of obtaining better terms from Canadian smelters, now in course of construction. Many recent consignments have been sent to the smelter of the Canadian Copper Company at Copper Cliff, Ont., where the terms are regarded as comparatively favorable.

The season of 1907 was characterized by continued expansion and greater attention to systematic and thorough development work on the part of producing mines. Early operations were largely conducted by crude, primi-

tive methods, which proved remunerative when applied to rich deposits lying near the surface. As the camp assumed more of a permanent character and deeper levels were reached the installation of modern machinery was soon found to be necessary, and the past year has witnessed the introduction of first-class steam and electric plants, with the most approved machines, on a large scale. All the important mines are now well equipped in this respect. The difficulty and expense attendant upon these installations has been very considerable and has only been justified by the confirmation of the extent and value of the deposits. Exploration has been pushed farther afield and discoveries made up the Montreal River and in the Temagami forest reserve, which foreshadow a wide extension of the silver-producing area. At the close of the year the number of shipping mines was 24. Returns to the Bureau of Mines covering the nine months ending September 30th give the output of silver as 6,919,987 oz., valued at about $4,312,000, which shows that notwithstanding a sharp decline in the price of the metal, the value of the entire year's output will mark a very substantial advance over the previous year's yield.

Iron and steel manufacture have made remarkable progress since 1897, consequent upon the discovery and utilization of large ore deposits and the development of the secondary processes of manufacture, stimulated largely by the heavy demands for railroad construction and the encouragement of the bounty system. In 1897 pig iron was produced to the amount of 24,001 tons, of the value of $288,127. The ore from which it was made was all or nearly all imported. In 1900 the pig iron product had increased to 62,386 tons, valued at $936,066. Iron ore was produced to the amount of 90,302 tons, value $111,805, of which 22,887 tons were smelted in Ontario, the remainder being exported. The marked increase of the iron ore output in 1900—amounting to 73,391 tons in quantity and $80,854 in value—was due to the opening of the Helen mine at Michipicoten. Markets were furnished for Canadian iron ore by the establishment of blast furnaces in Hamilton, Deseronto and Midland, and the progress of the mining industry was greatly stimulated. In 1901, 273,538 tons were produced, the greater proportion from the Helen mine. The quantity smelted in Ontario was 194,510 tons. The pig iron output was 116,370 tons, of the value of $1,701,703. Steel, which appeared on the list for the first time in 1900, when the output of 2,819 tons was valued at $46,380, increased in 1901 to 14,471 tons, worth $347,280. The following year witnessed a still more notable expansion. The iron ore produced for 1902 was 359,288 tons, worth $518,445, the pig iron product, 112,687 tons, value $1,683,051, and the steel output, $68,802 tons, valued at $1,610,031. In 1905 iron ore was produced to the amount of 211,597 tons, value $227,909, the pig iron output had increased to 256,704 tons, value $3,909,527, and steel to 138,387 tons, value $3,321,884. Latterly a good deal of fluctuation was occasioned by financial difficulties of the Lake Superior Corporation, controlling the Sault Ste. Marie industries, necessitating the temporary suspension of their mining and iron manufacturing operations. These having been overcome, productive activity has for some time been resumed. In 1906 the output of iron ore was 128,099 tons, worth $301,032, and that of pig iron 275,558 tons, of the value of $4,554,247. Returns of the quantities produced during the nine months of 1907, ending September 30th, are as follows: Iron ore, 141,719 tons; pig iron, 180,663 tons; steel, 120,077 tons. A noteworthy feature of the industry during 1907 is the rapid development of the twin cities of Fort William and Port Arthur as an iron centre, owing to the opening of the blast furnaces of the Atikokan Iron Company at the latter point and the development of the extensive iron ore deposits of the Atikokan iron range as a source of supply. Another large deposit at Moose Mountain, north of Sudbury, is being developed by the Moose Mountain Iron Mining Company, Limited, access to it having been afforded by an extension of the Canadian Northern Railway. The establishment of large smelting works and subsidiary industries drawing their raw material from this source, either at Toronto or some other convenient point in Ontario, is in contemplation. Altogether the outlook for the rapid and steady growth of the iron mining industries and the various metallurgical branches dependent upon it is exceeding auspicious. The exhaustion of the American iron ore deposits will necessarily in the near future give increased value to Canadian ores and bring into the market many areas the working of which has hitherto been unprofitable.

The last two or three years have witnessed a marked expansion in the nickel-copper industry, the sole producers of the Sudbury district for some time having been the Canadian Copper Company and the Mond Nickel Company. The product is exported in the form of matte for treatment abroad. From an output of 14,034 tons of matte, with nickel values of $359,651 and copper values $200,067 in 1897, the yield had increased in 1905 to 17,388 tons of matte, produced by the Bessemer process, yielding value of $3,354,934 nickel and $688,993 copper. The nickel and copper values produced in 1906 were $3,836,419 and $998,548 respectively. Later returns appear to show that the figures for 1907 will at least equal these. The production of copper apart from nickel has been comparatively small of late, but it is hoped that with the resumption of activity at the old Bruce mines and application of modern methods of mining and treatment satisfactory results may shortly be obtained.

The production of gold, to which formerly a good deal of capital and enterprise was devoted, has not of late occupied so prominent a position among the mining industries of the Province. This is perhaps mainly due to the fact that much of the effort to develop gold mines was misdirected, even when honestly undertaken, and operations conducted on a scale and at a cost by no means warranted by the indications. Out of very many companies started with glowing anticipations, only a very few are still in the field. During the period under consideration the high water mark of production was reached in 1899, when 27,594 ounces of gold were produced, valued at $424,568. Since that time the yeld has fallen off, the value of the output being $99,885 in 1905, and $59,274 in 1906. During 1907 there was some activity in the Manitou Lake area, more especially in connection with the Laurentian mine. Recent discoveries of gold in the Larder Lake and Abitibi Lake areas and other points in Northern Ontario have resulted in many locations being taken up and the formation of numerous companies; but as yet little actual development has been done.

The output of zinc ore is small and fluctuating, the largest output being for 1899, when it was produced to the value of $24,000. In 1906 the yield was 400 tons, valued at $6,000, and the product for the first nine months of 1907 was about the same.

Mica takes an important place among the non-metallic products. The value of the output in 1898 was only $6,000. It had increase to $102,205 in 1903, but dropped

the following year to $37,847. The yield for 1906 was 355 tons, valued at $69,041. The industry was active during 1907 until the financial depression affected it adversely.

Talc first appeared on the list of mineral products in 1899, when the output was valued at $500. Its production has never attained large proportions, the highest figure being 1,235 tons, valued at $3,030, in 1906.

The production of graphite reached its highest point in 1900, when the yield was valued at $27,030. It had decreased to $9,825 in 1905, but the output of the following year was 1,772 tons, valued at $15,000.

Corundum was added to the list of mining products in 1900, with a yield valued at $6,000. Since then the output has been steadily increasing, the returns for 1906 showing a production of 2,914 tons, worth $262,448.

COAL MINING IN CAPE BRETON DURING 1907.

(By our own Correspondent.)

In looking over the coal production of Cape Breton for 1907, it is seen that outputs on the whole have been smaller than in 1906, and on the face of things it would appear as if little or no advance had been made. It would be very inaccurate, however, to imagine that any slackening of production is to be looked for in the future or that the industrial prosperity of Cape Breton has suffered any setback. The exact converse is the truth, for 1907 has been a year of steady development with normal outputs. The boom days are gone, we hope forever gone, together with the feverish uncertainty and abnormal inflation that characterise such periods.

Work throughout the year has proceeded very steadily and there has been no disturbing feature of any moment. The number of accidents during the twelve months have been in about the same ratio to tonnage as in previous years, and Cape Breton probably occupies the proud position of producing more tonnage per accident than any other coal mining district in the World. It is a matter for congratulation that no one accident involving the loss of more than three lives has occurred during the year.

The coal trade was greatly hampered in the spring by exceptional storms and by heavy fields of drift ice, along the shores of the Island, which persisted until the middle of the month of June. At least a fortnight of March was lost time by reason of snow storms, and on the 7th March Cape Breton was visited with a blizzard of a severity that will be long remembered. The weather conditions of the spring were chiefly responsible for the lower outputs in 1907.

The scarcity of labor was perhaps not so pronounced as in 1906 and 1905, but nevertheless at many of the mines men were scarce. There was no scarcity of general laborers or surfacemen, on the contrary in fact, but miners and under-ground workers generally, were in great demand, particularly at the smaller and remoter collieries on the western side of the Island. In common with the rest of the world Cape Breton suffered from a marked decrease in the productive force of labor, and at every colliery the tonnage produced per man employed was lower than in any previous year. This same phenomenon, for phenomenon it is, has been noticed and commented upon in the United States, in Great Britain, in Germany and in Belgium, and whatever the reason may be it is a fact that the miner of to-day is producing less coal than he has done previously. Although the output in Cape Breton during 1907 fell below that of 1906, the number of men employed was greater in 1907 than in the year preceding.

Taking the collieries from East to West in order, we come first of all to the Port Morien Basin mine, known for many years as the Gowrie mine. The old Gowrie and Blockhouse Company has been acquired by the North Atlantic Collieries Company, a corporation in which Mr. Ochiltree MacDonald and Mr. F. B. Pearson are prominently interested. The mine is at present producing about 200 tons a day, and it is expected next summer to raise this to 500 tons. The new company is making numerous improvements in plant and general layout and are spending a large amount of money on developments. At present about 200 men are employed in all.

The Broughton Colliery site, which lies back of Port Morien and the areas of the Dominion Coal Company, is quite deserted. The Broughton enterprise was ill starred, like almost every purely English mining company that has been operated in Cape Breton. English capital might yield better returns to the investors in Canadian enterprises if their engineers would take a little native advice. However this may be, Broughton Colliery is not likely to figure as a producer yet awhile.

A good deal has appeared in the press lately about the Cumberland areas, which lie in close proximity to those of the Broughton people. It is stated that the Dominion Iron & Steel Company have obtained an option on them, and will straightway proceed to develop them on a royalty basis. These areas have been only slightly prospected and very little is really known about them. The Steel Company have several drills at work on the ground at the present time. The district is a more or less troubled one, lying as it does between two anticlines, and considerable prospecting will be needed before any large expenditure is justified, so that it is not probable that any immediate development is to be looked for. The Steel Company have spent a lot of money during 1907 on prospecting, having put down bores in several places at the head of Lingan Bay, and in the more or less unexplored territory between that place and Kilkenny Lake, outside the supposed outcrop of the Mullins Seam.

The Dominion Coal Company's mines have passed an uneventful year, work having proceeded very steadily without any particular interruptions. The outputs for the various mines comparing 1906 with 1907, were as follows:—

	1906.	1907.
No. 1 Phalen	528,160	498,948
" 2 Phalen	609,140	638,579
" 3 Phalen	365,236	348,383
" 4 Phalen	545,003	520,254
" 5 Phalen	587,824	635,903
" 6 Phalen	113,467	204,616
" 7 Hub	146,412	4,483
" 8 Harbor	229,636	224,097
" 9 Harbor	380,320	363,873
" 10 Emery	47,818	100,617
Total	3,552,746	3,539,753

The outputs of the Phalen seams are about the same with the exception of the new mine at Big Glace Bay, No. 6, whose output is steadily increasing. It is expected that in the summer of 1908 this mine will be producing 1,000 tons per day.

The Hub Colliery was pumped out early in November and is again producing coal. It will be remembered that this mine got on fire in December 1906, and in order to extinguish the fire it was necessary to let in the Atlantic Ocean. Most of the year has been occupied in pumping out the workings and replacing the surface erections which were wiped out by the fire. The work of pumping out was slow owing mostly to the virulent manner in which the Hub pit water attacks metals. Several peculiar phenomena were noticed in pumping out this mine. When the sea water was allowed to flow into the workings the Bay was full of "lolly" ice which flowed in with the water. At water level this formed a substance like coarse sea salt, which was left in the roadways as the water receded. In the broiling days of the summer it was strange to see this reminder of the drift ice of the spring. This frozen substance absorbed enormous quantities of the carbonic oxide, which was formed by the smothered fire, making the task of removing it somewhat disagreeable to the workmen. As soon as the mass was disturbed by the shovel the carbonic oxide diffused itself into the atmosphere, making the lamps to burn brightly and giving the men more or less headache.

The mines on the Harbor Seam kept about the same production as in the previous year.

The new longwall mine on the Emery Seam produced about 100,000 tons in the year. A good many hindrances have been met with in opening out this mine, due chiefly to the difficulty of obtaining miners accustomed to longwall workings. This difficulty is now almost overcome, and during 1908, No. 10 will probably produce 150,000 tons. The Emery Seam is a hard bright coal, very suitable for household or steam purpose and will be very popular some day.

The Coal Company's new mine at Victoria has two slopes, each down about 300 feet. The Victoria seam at this point is about 6 feet 3 inches thick with an excellent analysis. The dip is about 1 in 4, and the face of the deeps is about half a mile from the sea, having 60 feet of cover at the present face. In the system of working to be adopted, advantage is to be taken of the grade in handling the coal underground. The rooms will be opened out to the rise, the full tubs being let down to the level by means of a gravity balance, which will at the same time haul the empty tub to the coal face. Small gathering haulage engines will be placed at the ends of the levels to convey the coal to the main haulage ropes. A small temporary plant is now installed, with boarding houses, etc., and about 75 men are working at the site. The railway from Grand Lake where the No. 12 branch will join the main line of the Sydney & Louisburg Railway is being rapidly graded, and will be completed in 1908.

During the year the Dominion Coal Company have made a good many additions to their plant and equipment. At No. 2 Colliery the Compressor House was enlarged and in addition to the compressors, now contains three 600 KW. generators, driven by 700 H.P. horizontal steam engines. This plant is intended to supply electric power to all the Glace Bay district collieries for pumping, screening, etc. A general scheme of electric pumping and haulage is being installed at the collieries for which the power is to be supplied from the No. 2 Power House.

Two new locomotives and a steam shovel have been added to the railway equipment, and a wrecking plant for assisting distressed shipping is now installed in a special building at Glace Bay.

Many advances in the way of safety have been made. Safety lamps are now in use in all the mines, and naked lights have very wisely abandoned altogether. The use of ordinary and compressed powder has been discontinued in dusty mines, and a high explosive is now used. The system of independent shotfiring is altogether done away with, and shots are now lighted by a responsible official. Unexpected inspections of the miners' clothing are made, and several men found with matches in their possession have been detected and punished. It is not by chance or altogether by reason of naturally safe mines that Cape Breton has been spared a disaster like those that have wrought such havoc in the States. Safety is the outcome of eternal vigilance, in which particular the present management of the Dominion Coal Company are not lacking.

A Rescue Building equipped with twenty Draegar breathing apparatus has been erected during the year, and a trained expert is now stationed there whose occupation it will be to train corps of men in the use of these apparatus. Their nature and use have been explained in the columns of the JOURNAL. In view of the recent explosions in the States and the futile attempts at rescue work there, the initiative of the Coal Company has been very abundantly justified.

The Nova Scotia Steel & Coal Company, like the Dominion Coal Company have a lessened annual output, but they have also like their neighbors been prosecuting necessary development work. The new mine at Point Aconi has commenced operations, and the branch line 2 1-2 miles connecting the colliery with the main line is also completed. No. 2 Colliery at Lloyds Cove, which was abandoned in 1904, is now being pumped out, and will be ready to hoist some time next spring.

Both the Nova Scotia Steel Company and the Dominion Coal Company have during 1907 built a good many workmen's houses, and both companies are selling these houses to their workmen on an easy instalment plan, which is being quite largely taken advantage of, the rate of interest being only 6 per cent., and the lot sold at a nominal figure. The Nova Scotia Steel Company have also installed an electrically driven haulage at their No. 5 Colliery. Electric power and electrically driven machinery is steadily increasing in favor in Cape Breton.

The production of the Nova Scotia Steel Company's collieries during the year, was as follows:—

No. 1	256,161
" 3	296,466
" 4	3,128
" 5	82,310
Total tons	638,065

The output of the Inverness Railway & Coal Company will be in the neighborhood of 250,000 tons, and will be about 40,000 tons in advance of 1906.

The trial of "Steel vs. Coal" which took place at Sydney before Judge Longley at midsummer, added a little to the gaiety of the Canadian nation. All the readers of the JOURNAL are of course familiar with the circumstances, and know all about Judge Longley's buttonhole, the pyrotechnic cross-examination of Sir Wm. Van Horne and Mr. F. P. Jones' two days on the witness stand; with Mr. Nesbitt's slightly theatrical eloquence and Mr. Lovett's monotonous, and at the same time, incisive logic. The course of the appeal trial at

Halifax, in December, brought out very little that was not said at the first trial. The decision of the full bench is expected about the middle of January, and until the case is finally disposed of, comment on the merits of the points under dispute would be superfluous and unwise.

No industrial disputes have occurred in Cape Breton during the last twelve months. The P. W. A. took the aggressive during the spring of the year, and refused to work with non-unionists. Their action resulted in several days of idleness, but the ultimate result was that most of the non-unionists joined the Association.

The three years' agreement between the P.W.A. and the Dominion Coal Company expired with 1907, and the men refused the Coal Company's proffer of a renewal of the contract upon the old term. The have made a demand on all the coal operators of Nova Scotia for a 15 per cent. increase on day labor, for a minimum fixed rate of $2.44 for all miners out of places, employed temporarily at other work, and for higher wages to all night shift men. The Dominion Coal Company announced on December 5th, that they would put a new schedule of rates into effect in the 6th of January. This schedule raises the price of workmen's coal from 90 cents, inclusive of hauling, to $1.50 for runmine and $1.00 for slack, exclusive of hauling; makes a cut of 4 1-2 cents in the pillar rate, and a few minor changes in the cutting rates. The whole of the gain to the company under these changes is to be applied in increasing the wages of the day laborer and loader, or in other words, the amount of money disbursed on the Coal Company's payrolls is to be more fairly distributed amongst its employees at the mines. The P.W.A. have applied to the Minister of Labor for a Board of Conciliation and Investigation under the Lemieux Act, and have appointed their representative in Dr. Arthur Kendall, M.P. Further developments will be awaited with interest, but no one thinks that any serious trouble will arise.

To sum up, we think it is safe to prophesy that from now on the coal production of Cape Breton will very steadily increase. Many of the older mines are becoming less productive, but new developments are under way to take their place. While many portions of the Dominion are feeling the pinch of poverty and financial tightness, Cape Breton is a place where work is plentiful and prosperity apparent. The revenues of Cape Breton are not dependent on the vagaries of the weather, and although we are very far East here, Cape Breton in many respects offers inducements that the much advertised West does not, particularly to the working miner.

THE TYRRELL PRIZE.

For the best Collection of Ontario Minerals.

We are authorized by Mr. J. B. Tyrrell, mining engineer, to state that in order to encourage investigation into the mineral resources of the Province of Ontario, he will give a prize of $100.00 in cash to any Canadian, not in the employ of a public institution or mineral dealer, who will personally make the best collection of minerals in the Province of Ontario during the year 1908.

The collection must consist of thirty or more mineral species.

Each specimen must be labelled with the exact locality from which it was obtained and the date on which it was collected. No specimen will be considered unless it is so labelled.

As far as possible all minerals must be correctly named.

A typewritten list of the specimens, with names of minerals and localities, in triplicate, along with a declaration stating that they were personally collected by the signer in the Province of Ontario in 1908 at the locality stated, must be sent in with each collection.

Prof. T. L. Walker, of Toronto University and Prof. W. Nicol, of Queen's University have kindly consented to examine the collections and award the prize, and the collections must be sent to them at some place which they will designate later, on or before the 1st of December, 1908. After the prize is awarded the collections may again be obtained by the owners.

ONTARIO'S ESTIMATED OUTPUT—1907.

T. W. Gibson, Deputy Minister of Mines.

The mining industry in Ontario reached high-water mark in 1907. Of silver and nickel, the two chief metallic products, the output was large. The Province is now contributing to the world's store of silver a quantity surpassed by three States of the American Union only. For the twelve months just closed the production of silver in Ontario may safely be estimated at not less than 9,000,000 ounces, practically the whole output being from the mines of Cobalt. The rise of this camp has been rapid; in 1904, which was the first year of production, some 206,875 ounces only were obtained. The whole yield down to the end of 1907 may be placed at about 22,000 tons of ore, containing 17,100,000 ounces of silver.

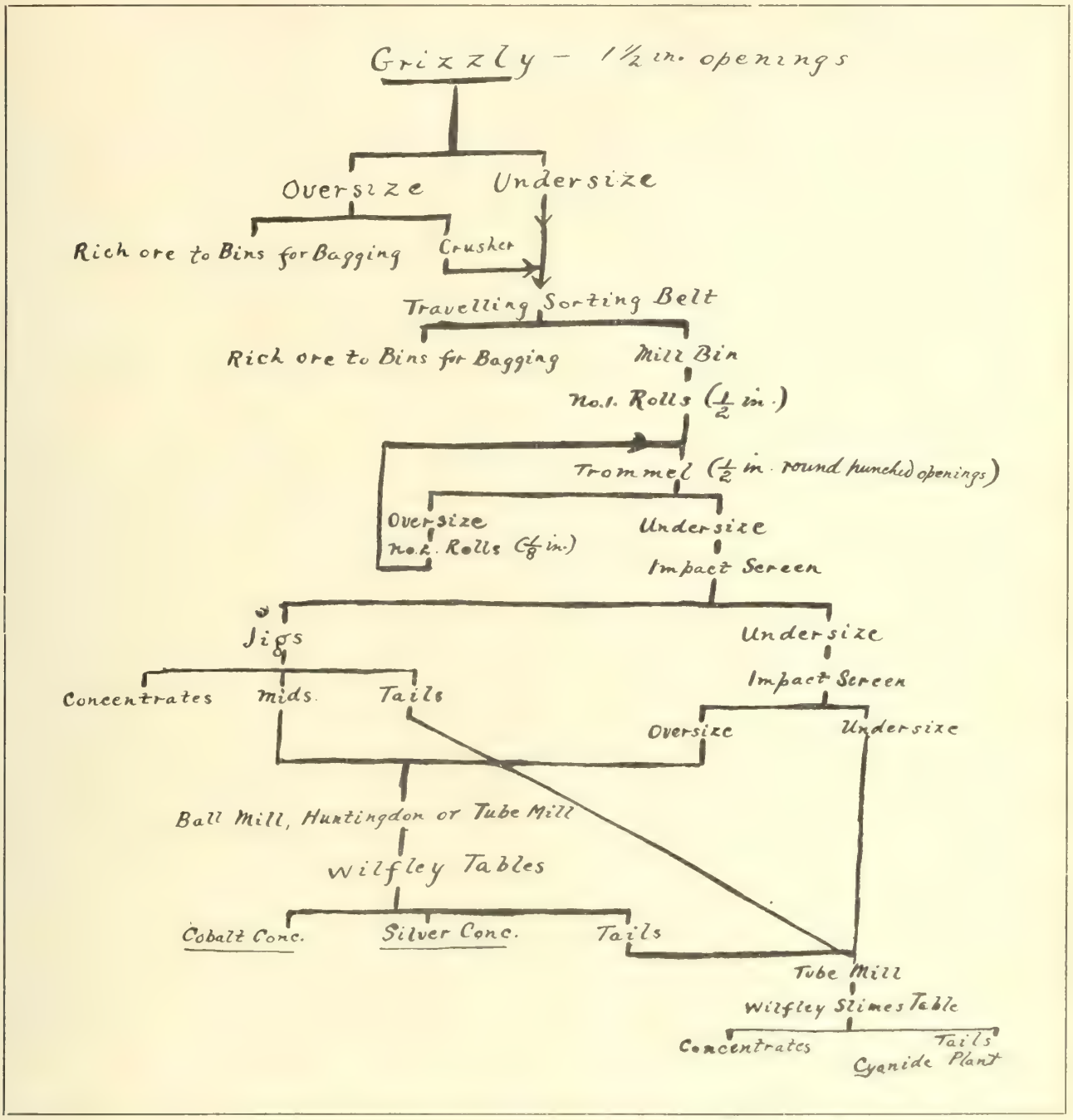
The production of the Sudbury nickel fields was on a scale similar to that of last year, when there were raised 10,776 tons of nickel and 5,260 tons of copper. In nickel Ontario easily leads the world, her only competitor, New Caledonia, having been left behind some years ago.

In iron ore the bulk of the tonnage still comes from the Helen mine, but the magnetite deposits of Moose Mountain, Bessemer, Atikokan, Wilbur and elsewhere are beginning to assume considerable importance. It is in every way likely that large shipments from all the points named will be made during 1908. The production of iron ore during the first nine months of 1907 was 141,719 tons. There are now seven iron furnaces in the Province, two having been added during the past year —one at Hamilton and one at Port Arthur.

There were important developments in the petroleum and natural gas fields of Ontario in 1907. The Tilbury East oil field is now producing nearly as much as Petrolea and Oil Springs, and the gas area of Tilbury and Romney is being steadily extended, especially towards the south. Other non-metallic products contribute to the general total, among them being salt, corundum, iron pyrites, feldspar and mica, most of which are produced chiefly in the eastern part of the Province.

The heavy fall in the prices of silver and copper will probably tend to keep down the production of these metals, especially the latter, in 1908. But despite temporary checks, the progress of mining in this Province, which has been most marked during the last few years, can hardly fail to continue at a similar, if not a greater rate.

Bgeinning January 1st, 1908, Mr. C. L. Rameau will be general manager of the West Canadian Collieries, Limited, with head office at Blairmore, Alberta. In future all communications should be addressed to Mr. Rameau.



COBALT ORE TREATMENT.

This flow sheet is gotten out to indicate the method which appears to the writer to be the most economical for handling the ores of Cobalt. In practice probably some of the mines would find it more advantageous to use several sets of jigs, in which case I would advocate single compartment jibs for No. 1, the tails being crushed in No. 2. Rolls and undersize from No. 1 trommel elevated back to the mill bin.

No. 1 tails and undersize from No. 1 impact screen through No. 2 rolls to No. 2 impact screen. Oversize to No. 2 jigs. Undersize either to table mill with tails or to No. 3 rolls—if a further set of jigs is found profitable. In such case No. 3 jigs would probably be of the four compartment type, giving separate concentrates of silver and cobalt. Mids to mill for tables and tails to tube mill for cyanide.

Such a system would have impact screens and jigs to handle products from 1-2 to 1-4, 1-4 to 1-8 and 1-8 to 1-16. The table mill should crush to 16 to 20 mesh, and the tube mill from 40 mesh up, the fineness being best determined after experiment with the ore handled. Tails would go to either tables or cyanide, depending on the cobalt and copper contents. Sliming the tails and using hot solutions and hot air agitation promotes the efficiency of the cyanide plant, and I believe that the multiplication of the jigs, which will decrease the capacity of the plant, will in most cases be unnecessary.

H. G. V. Adler.

Mr. W. A. Carlyle, of 62 London Wall, London, E.C., has been appointed consulting engineer to Le Roi Mining Company. Until last summer Mr. Carlyle was general manager of Rio Tinto Mining Company. Prior to this he was resident engineer at Rossland of Le Roi mine. Mr. Carlyle is a graduate of McGill University.

THE LARDER LAKE DISTRICT.*

R. W. Brock.

(Continued from last issue).

Lower Huronian.

On the upturned edges of the Keewatin and Laurentian, eroded into hill and valley, the Lower Huronian rocks were laid down. The actual contact between the Huronian and the Keewatin is usually concealed by drift. At certain points at least, the basal member of the Lower Huronian appears to be a breccia-conglomerate, carrying angular fragments of the Keewatin rock immediately underlying it, as seen on island CC[3], on the small patches of conglomerate left on Gold Hill, and along the shore near the Reddick claims. This rock does not appear to have any considerable thickness. It is succeeded by a thin band of quartzite, and the latter by a considerable thickness of slate. This is again succeeded by quartzite, which becomes coarser and contains a few boulders near its top, and is succeeded by a thick coarse breccia-conglomerate. The thickness of the various members of this group varies at different places. The slates must have a maximum thickness of at least several hundred feet, the quartzites one hundred and twenty-five, and the conglomerate several hundred feet.

The boulders of the conglomerate are rounded to angular, and vary in size from small pebbles to masses 10 or 12 feet in diameter. The great mjority are under a foot in diameter. They include all the Keewatin and Laurentian rocks recognized in the district, besides numerous boulders of red and of gray granite, jasper, and finely banded jasper-magnetite—Iron Ore formation.

Boulders of the Keewatin containing mineralized quartz veins cut off sharply at the edge of the boulder are not infrequent. These veins are mineralized by pyrite, galena, specularite, etc., just as the veins now found in the Keewatin. Boulders of the rusty weathering dolomite(?) with mineralized quartz are among these Keewatin boulders, showing that some of the mineralization of this district dates back to pre-Huronian times.

Certain beds of the conglomerate are apt to be rich in boulders of one kind of rock, and adjoining beds rich in another. The supply of boulders evidently came from alternating sources.

The conditions under which the conglomerate was laid down have not been deciphered. The most obvious explanation is that it is of glacial origin. In this case the basal conglomerate sometimes found, made up of fragments from the immediately underlying Keewatin, would represent uneroded and untransported remnants of the earlier Huronian beds, while the slates, quartzites, and upper conglomerate would represent more or less sorted glacial debris.

Some striated boulders of the conglomerate at Cobalt, found by A. P. Coleman,[4] have been taken by him as proof of the glacial origin of the Lower Huronian. The latter evidence, as pointed out by W. G. Miller, is not conclusive, as the rocks at Cobalt have been much disturbed, and some, if not all, of the striations to be seen on the boulders are to be accounted for by these movements, which have slickensided the boulders. Referring to the origin of the Cobalt conglomerate, Miller says:[5] "In the present state of our knowledge we have little warrant for claiming that the granite boulders, often two or three feet or more in diameter, and distant a couple of miles from exposures of the rock, indicate glacial conditions during Lower Huronian times, although we have no proof to the contrary."

The thickness and widespread extent of the conglomerate in Northern Ontario, where its general characteristics seem to remain constant throughout, the clean-swept and often rounded surfaces of the older rocks on which it is frequently laid down, and the extraordinary variation in the size of the boulders—these and other facts stated above regarding the conglomerate of Larder lake, furnish the strongest evidence yet found, for a glacial origin. But there are still difficulties in the way of its acceptance. The deposits cannot be said to have the appearance of glacial deposits. There has been no boulder clay recognized—the material has at least been re-sorted.

Many of the boulders have re-entrants; when polished they have often the form of boulders worn by river sand.

The Huronian is for the most part undisturbed and almost flat-lying. The slates might be expected to contain fossil remains, if animals with hard parts existed in the waters in which these muds were deposited. None, however, were discovered. Where examined, the Huronian rocks appeared to be barren of all trace of mineralization, except in places disturbed by later eruptions, where some quartz veins were occasionally developed. In the Cobalt district, however, the Lower Huronian is probably the chief mineral-bearing horizon.

Post-Lower Huronian.

At a few points, cutting the older rocks and the Lower Huronian, is an igneous rock which is in places a gabbro, in others a diabase. It is exposed on the north side of "A.A." island; on a reef near the east shore north of this island; on the east shore east of "R" island[6]: and at the head of Fitzpatrick's bay. In places it is a coarse feldspar-pyroxene or hornblende rock with red feldspar segregations like the diabase near Cobalt. At other places it is fine grained, with small lath-shaped feldspars and a pronounced ophitic structure. At the head of the southeast bay, at the south end of Fitzpatrick's bay, behind the cabin, its contact with the Lower Huronian conglomerate can be traced. The line of contact is irregular, the conglomerate is somewhat altered along it, while the diabase is finer grained, frozen tightly to the conglomerate, and in places becomes more basic with biotite distinctly developed. Its relationship here suggests a sheet of diabase intrusive between the conglomerate and the Keewatin. In other places it probably breaks up through the Huronian. On the little reef near the east shore north of Island "A.A." the diabase contains a segregation of epidote with a little quartz, calcite and copper pyrites.

Cutting the Keewatin and porphyry are dikes of basic rock, in which biotite, chlorite and hornblende are now prominent. It has little aplite stringers through it, which, however, may be segregations from its own magma.

Later than these dikes and cutting the Keewatin and Huronian, are dikes of a basic rock which probably represents a biotite-lamprophyre. The basic edge of the diabase resembles them somewhat, and they might possibly be intrusions of the diabase magma.

A line of disturbance of some kind extends northward from Larder City. The strike of the rock differs on either side of this line, and the conglomerate at Larder City, which contains similar boulders to the ordinary Huronian conglomerate is squeezed almost to a schist. The boulders are drawn out and flattened. The dikes

*Sixteenth Annual Report of the Ontario Bureau of Mines.

which cut it also show signs of pressure. This probably is a fault line, but as most of the ground about here is drift-covered and muskeg, the exact cause of this disturbance was not ascertained.

Glacial.

The exposed rock surfaces are usually rounded, polished, fluted and striated, furnishing evidence of extensive glaciation. Glacial erratics, some very large, are scattered round. The direction of ice movement as recorded by striations averages about 169 degrees astronomic. The local variations from this are very slight. The erratic boulders are much more numerous in hollows and protected places, while those still left on the rock surfaces are generally large, suggesting that these surfaces have since been wave swept. Further evidence of this is afforded by the deposits of sand and gravel which cover large areas, and by deposits of Saugeen clay—a well stratified



Quartz vein (white) in Keewatin greenstone. The quartz contains a little scattered chalcopyrite, galena, specularite, etc.

interbanded sand and clay in one-half inch to one inch bands.

The glaciation has cut away the weathered and rotted rock surfaces and scoured the pre-glacial valleys, sweeping away any of the old sands and gravels.

Boulder clay has for the most part been removed by the later water action, but at one or two protected points a little was believed to occur.

Ores.

In the limited time spent in the field only some of the claims could be visited. The claims which were considered locally to give the most promise, and to be typical of the camp were, however, seen. Most of the "showings" occurring in the band of rusty weather "dolomite,"(?) where seamed with quartz stringers, which is often the case near pegmatite or porphyry dikes, or in the Keewatin greenstone were mineralized with quartz near similar dikes. There are some well defined veins carrying a little pyrite or chalcopyrite, a few specks of galena, and perhaps zinc blende, and in places a good deal of specularite. Sometimes the latter is in rosetted form. Some of the quartz veins are several feet wide, swelling out in places to large masses 10 or 12 feet in diameter. The quartz veins seen by the writer looked very lean, and where sampled ran nothing but a trace, except in picked specimens rich in sulphides, which might go a few dollars per ton in gold and silver. Mr. N. L. Bowen, who is continuing the geological mapping, reports, however, that since the writer's departure a well defined quartz vein has been found on one of the claims of the Chesterville group, which furnishes good specimens of free gold.

On the Gold Hill claim, which has yielded some fine specimens showing free gold, the country rock is diorite (field name) cut by pegmatite. Stringers of quartz, with some feldspar, from six inches down, in width, traverse the greenstone in the neighborhood. The quartz is rather watery in appearance and holds a little copper pyrite, specularite and silicified inclusions of the country rock. A little pyrite is developed in the country rock near by, but very little in the quartz itself. Free gold occurs in places in the quartz, in the silicified inclusions of country rock and in the country rock near the stringers of quartz.

The claims on the silicified band of rusty weathering "dolomite"(?) that show values, have much the same characteristics. The "dolomite"(?) with its peculiar green serpentine mineral developed in bands, is seamed with reticulating quartz stringers from a few inches in width to miscroscopical dimensions. Some carbonate is often interbedded in the quartz or forms parallel bands with it. The country rock between stringers is frequently silicified to a quartzite-like material. The quartz contains a little pyrite and chalcopyrite, a few specks of galena and perhaps a little specularite. The quartz stringers are sometimes predominantly parallel to the strike, sometimes predominantly across it, and sometimes quite irregularly distributed. While somewhat rusted on the surface, the oxidation does not usually extend an inch in depth, where the clear unoxidized quartz is encountered. It is sometimes milky white and sometimes somewhat rosy and watery. Through it in places is sprinkled free gold, usually in fine particles, but sometimes in grains the size of a pea or in little plate-like masses.

At the bottom of the two pits on the Knott claim of the Reddick group, about 14 feet below the surface, the gold seems to be as abundant in the fresh quartz in the bottom as near or on the surface. The gold has a fine color and is evidently of a high degree of purity. On the Harris-Maxwell claim a small branching dike of black trap-like material cuts the quartz. The gold occurs in the quartz particularly round galena and near the little black dike. It is also found near the quartz stringers in the silicified country rock.

On the Reddick claim two sets of quartz stringers occur, running for the most part across the strike. The older set dips about 60 degrees east, and consists of a blue watery barren quartz. The others, which have a vertical or slightly westward dip, are of white milky quartz, which carries some free gold. They are later than and cut the former set of stringers. These stringers end rather abruptly at the edge of this band against a soft grayish schist. The width of the band of silicified and

veined dolomitic rock is not easily determined, as edges are rarely exposed. On the Knott claim at least 100 feet in width is exposed, all veined in much the same way, and, it is claimed, showing gold values for the whole distance. On the Harris-Maxwell the width exposed is still greater, and gold may be obtained at points scattered over this whole exposure.



Gold-bearing quartz stringers in serpentinized and silicified dolomite (?).

A shipment from the Harris-Maxwell of 1,500 pounds was sent during the winter to the mill at the School of Mining, Kingston. It returned $13.20 per ton. The hole from which this rock was said to have been taken was 6 or 8 feet across. It is claimed that the greenish silicified rock between the quartz stringers gave assay returns of $8 per ton.

Possibilities.

Very little development work has been done, the two fourteen foot holes in the Knott claim representing the most extensive development in the camp. It has not yet been proved what "run of mine" might be expected from any place. Some of the stringers are quite rich, but they seem to be too small and irregular to be mined by themselves, and it would appear that the whole rock would have to be taken. Over what area such material could profitably be mined and what it would run, can only be satisfactorily determined by mill tests. Several of the companies have ordered small stamp mills, and parts of some of them reached the camp before the spring break-up. Since then it has been impossible to get the complete plants in or to send out trial shipments, so that no such tests have yet been possible. One small mill on the lake, run on the custom basis, could probably furnish all the companies the information necessary regarding what might be pay ground, the probably values to be expected, and whether it is desirable to erect a mill on their own properties.

In many places this band of "dolomite"(?) rock contains very few quartz stringers, and often even when well-cut up by them and otherwise apparently quite promisisng, samples fairly taken will not yield values sufficiently high to warrant further attention. This rock, however, forms a long continuous band, a little north of the lake, and is exposed at several other places, so that there is a considerable area over which values might be found. On a few claims very fine samples of free gold, nicely disseminated through a considerable extent of rock, have been found. Further prospecting may increase the number of gold "showings." From the character of the quartz and gold, fourteen feet below the surface, it looks as if gold might continue to exist in a free state for some depth. Though the stringers with gold are small and irregular, and therefore make a rich workable ore uncertain, there seems to be a reasonable chance that at some points by mining the whole rock, a large tonnage of low grade ore may be developed, with perhaps occasional rich bunches. If further work and mill tests prove this to be the case, a few dollars per ton is easily won gold (as the gold here so far seems to be), would constitute good pay ore. With a sufficient tonnage and perfect transportation facilities even three dollars per ton might be made to pay. There are some claims, therefore, that are worth exploitation along these lines.

As might be expected from the number of "snow-stakings," the majority of the claims have little present or prospective value.

The gold occurrence bears some resemblance to the Lake of the Woods and Rainy River, but here the stringers are for the most part independent of the schistosity, while in Northwest Ontario, the quartz lay between the bands of rock.

It will be noticed that the "showings" so far discovered are all in the Keewatin rocks, and that the main mineralization has been accomplished in pre-Huronian times. The undisturbed Lower Huronian is here, so far as could be seen, absolutely barren. Its only chance would seem to be for an old Huronian placer deposit in the conglomerate, which the mineralized fragments of Keewatin in the conglomerate might seem to suggest as possible. The fact that waste by erosion exceeded atmospheric weathering prior to the deposition of the Huronian, lessens the possibility of such concentration, and the uncertainty regarding the origin of the conglomerate makes it impossible to give a definite answer to the question.



Open cut on the Harris-Maxwell, from which a shipment of 1,500 lbs. was made to the School of Mining mill at Kingston, which yielded returns of $13.20 per ton.

Where the Lower Huronian is disturbed by faulting and large intrusions of the later diabase, it might be mineralized. These are the conditions at Cobalt. The intrusions seen at Larder lake are small and the effects extremely local, but a small amount of mineralization has resulted. It is interesting to find cobalt bloom in a

calcite stringer on one of the Chesterville claims at the head of the northeast arm. On Wendigo lake, to the south of Larder lake, cobalt has also been found.

There is very little possibility of modern placers being encountered. The loose material and rotted rock surfaces have been removed by the heavy glaciation and scattered somewhere south. Since glacial times very little weathering and consequently very little concentration of gold in sands ad gravels has taken place.

North of Larder lake to Abitibi, the geological conditions appear to be much the same. Gold has been found at Abitibi, and at points between these two lakes, so that a very large extent of territory exists in which to prospect for gold, with fair chance for success.

REFERENCES.

[3] See map of Larder lake.

[4] 19th Annual Meeting, Geological Society of America, New York, Dec., 1906.

[5] Rep. Bur. Min., 1905, Part II. See also Canada Mining Journal, No. 1, Vol. I.

[6] See map.

A FILTER TUBE.

In a former paper on "A New Filter" "Journal American Chemical Society," Vol. xxvii., p. 287, and "The Chemical Engineer," Vol. ii., p. 39, the writer described an ash-free pulp filter made by acting on unwashed Swedish filter paper, in a ceresin vessel, with hydrochloric acid of 1.18 sp. gr., to which has been added a little hydrofluoric acid. The resulting pulp is stirred up with distilled water and is deposited under suction on filter-felt in a special filter tube. The filter is effective and rapid for most filtrations, and especially so in the case of barium sulphate, which is perfectly retained without a trace passing through, if the filter is well rammed down with the stamper shown in the sketch.

This method of filtration is very useful for the filtration of sulphides and other precipitates which are readily oxidizable and which should be filtered and washed with exclusion of air.

For large precipitates of iron and alumina the ordinary method of filtration is preferable.

The filter tube in present use is perhaps enough of an improvement on the form previously described to warrant this note. It consists of an ordinary carbon tube, one inch in internal diameter, provided with a device for supporting the filter and for pushing it out of the tube. This device is a glass tube passing through the stem of the filter tube and provided with a flattened and perforated bulb at the end as shown in the sketch. On this is a close fitting disc of piano or filtering felt on which the paper pulp is deposited. After filtering, the felt and pulp filter are pushed out of the tube and the filter is picked off with a brass forceps. If the tube is fairly uniform in diameter, and the end is neither flared or drawn in by heating in the flame, no precipitate will adhere to the sides. These tubes were made for me by Eimer & Amend of New York.

In many cases where rubber is not objectionable a home-made device is equally effective. The filter support is made of sheet rubber about 3-8 inch thick. Five small holes are made through it by use of a cork-borer. Another small hole is made in the centre in which is tightly fitted a glass rod small enough to pass through the stem of the filte tube and long enough to push out the filter.

For carbon filtration the tube is 3-4 inch in diameter and glass wool is used in place of the piano-felt, on which the finely divided, well ignited asbestoes is deposited.

Perforated platinum and porcelain discs have been tried with no advantage over the device above described. In some cases it is preferable to use a disc of washed filter paper in place of the piano-felt, but filtration is slower.

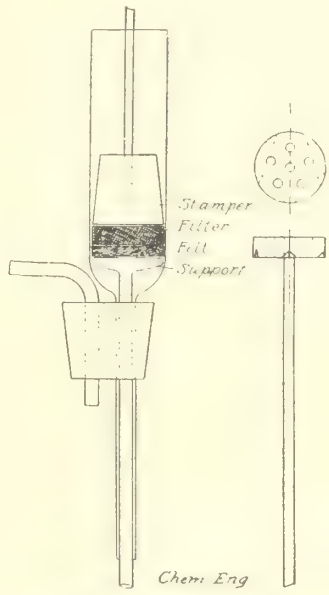


Diagram of Filter Tube.

Some of the advantages of this method of filtration, now in successful use in my laboratory for three years, are:—

First—Effective retention of fine precipitates like barium sulphate.

Second—Rapid filtration.

Third—Negligible ash.

Fourth—Filtration and washing with exclusion of air.

Fifth—More thorough washing, with less wash water, than by the ordinary method.

For further retails the reader is referred to the former paper noted above.—*The Chemical Engineer.*

MINING IN NEW MEXICO.

From figures recently published it is ascertained that New Mexico had, during 1906, 71 producing mines. The deep mines number 52, and placers 19. The total value of metals produced in 1906 was $3,203,730. Of this gold to the amount of 14,174 fine ounces ($293,019), and silver 491,127 fine ounces ($329,055) were recorded.

The average value per ton of ore handled in 1906 was $15.42, as compared with $16.21 in 1905 and $18.19 in 1904. The average value per ton in gold and silver for the silicious ores handled in 1906 was $16.69, as compared with $11.18 in 1905.

For the total tonnage of ore treated or sold from lode mines the following averages are given: 207,691 tons were treated. The average gold and silver recovered per tons was $2.99. This was divided as follows:

Silicious ore, average recovrey, gold and silver	$16.69
Copper ore, average recovery, gold and silver	2.41
Lead ore, average recovery gold and silver	2.14
Zinc ore, average recovery gold and silver	0.05

STANDARD METHODS FOR THE ANALYSIS OF IRON—AMERICAN FOUNDRYMEN'S ASSOCIATION.

H. E. Diller, Secretary.

Determination of Silicon.

"Weigh one gramme of sample, add 30 c. c. nitric acid (1.13 sp. gr.); then 5 c. c. sulphuric acid (conc.). Evaporate on hot plate until all fumes are driven off. Take up in water and boil until all ferrous sulphate is dissolved. Filter on an ashless filter, with or without suction pump, using a cone. Wash once with hot water, once with hydrochloric acid, and three or four times with hot water. Ignite, weigh, and evaporate with a few drops of sulphuric acid and 4 or 5 c. c. of hydrofluoric acid. Ignite slowly and weigh. Multiply the difference in weight by .4702, which equals the per cent. of silicon."

Determination of Sulphur.

Dissolve slowly a three gram sample of drillings in concentrated nitric acid in a platinum dish covered with an inverted watch glass. After the iron is completely dissolved, add two grams of potassium nitrate, evaporate to drynes and ignite over an alcohol lamp at red heat. Add 50 c. c. of a one per cent. solution of sodium carbonate, boil for a few minutes, filter, using a little paper pulp in the filter if desired, and wash with a hot one per cent. sodium carbonate solution. Acidify the filtrate with hydrochloric acid, evaporate to dryness, take up with fifty c. c. of water and two c. c. of concentrated hydrochloric acid, filter, wash and after diluting the filtrate to about 100 c. c. boil and precipitate with barium chloride. Filter, wash well with hot water, ignite and weigh as barium sulphate, which contains 13.733 per cent. of sulphur.

Determination of Phosphorous.

Dissolve two grams sample in fifty c. c. nitric acid (sp. gr. 1.13), add 10 c. c. hydrochloric acid and evaporate to dryness. In case the sample contains a fairly high percentage of phosphorous it is better to use half the above quantities. Bake until free from acid, redissolving in twenty?five to thirty c. c. of concentrated hydrochloric acid, dilute to about sixty c. c., filter and wash.

To make the molybdate solution add one hundred grams molybdic acid to 250 c. c. water, and to this add 150 c. c. ammonia, then stir until all is dissolved and add 65 c. c. nitric acid (1.42 sp. gr.). Make another solution by adding 400 c. c. concentrated nitric acid to 1,100 c. c. water, and when the solutions are cool, pour the first slowly into the second with constant stirring and add a couple of drops of ammonium phosphate.

Determination of Manganese.

Dissolve one and one-tenth grains of drillings in twenty-five c. c. nitric acid (1.13 sp. gr.), filter into an Erlenmeyer flask and wash with thirty c. c. of the same acid. Then cool and add about one-half gram of bismuthate until a permanent pink color forms. Heat until the color has disappeared, with or without the precipitation of manganese dioxide, and then add either sulphurous acid or a solution of ferrous sulphate until the solution is clear. Heat until all nitrous oxide fumes have been driven off, cool to about 15 degrees C.; add an excess of sodium bismuthate—about one gram—and agitate for two or three minutes. Add fifty c. c. water containing thirty c. c. nitric acid to the liter, filter on an asbestos filter into an Erlenmeyer flask, and wash with fifty to one hundred c. c. of the nitric acid solution. Run in an excess of ferrous sulphate and titrate back with potassium permanganate solution of equal strength. Each c. c. of No-10 ferrous sulphate used is equal to 0.10 per cent. of manganese.

Determination of Total Carbon.

This determination requires considerable apparatus; so in view of putting as many obstacles out of the way of its general adoption in case of dispute your committee has left optional several points which were left to bring no chance of error into the method.

The train shall consist of a pre-heating furnace, containing copper oxide (Option No. 1) followed by caustic potash (1.20 sp gr.), then calcium chloride, following which shall be the combusion furnace in which either a porcelain or platinum tube may be used (Option No. 2). The tube shall contain four or five inches of copper oxide between plugs of platinum gauze, the plug to the rear of the tube to be at about the point where the tube extends from the furnace. A roll of silver foil about two inches long shall be placed in the tube after the last plug of platinum gauze. The train after the combustion tube shall be anhydrous cupric sulphate, anhydrous cuprous chloride, calcium chloride, and the absorption bulb of potassium hydrate (sp. gr. 1.27) with prolong filled with calcium chloride. A calcium chloride tube attached to the aspirator bottle shall be connected to the prolong.

In this method a single potash bulb shall be used. A second bulb as sometimes used for a counterpoise, being more liable to introduce error than correct error in weight of the bulb in use, due to change of temperature or moisture of the atmosphere.

The operation shall be as follows: To one gram of well mixed drillings add 100 c. c. of potassium copper chloride solution and 7.5 c. c. of hydrochloric acid (conc.). As soon as dissolved as shown by the disappearance of all copper, filter on previously washed and ignited asbestos. Wash thoroughly the beaker in which the solution was made with 20 c. c. of dilute hydrochloric acid (1.1), pour this on the filter and wash the carbon out of the beaker by means of a wash bottle containing dilute hydrochloric acid (1.1) and then wash with warm water untill the acid is washed out of the filter. Dry the carbon at a temperature between 95 and 100 degrees C.

Before using the apparatus a blank shall be run and if the bulb does not gain in weight more than 0.5 milligram, put the dried filler into the ignition tube and heat the preheating furnace and the part of the combustion furnace containing the copper oxide. After this is heated start the aspiration of oxygen or air at the rate of three bubbles per second, to show in the potash bulb. Continue slowly heating the combustion tube by turning on two burners at a time, and continue the combustion for thirty minutes if air is used; twenty minutes if oxygen is used. (The Shimer crucible is to be heated with a blast lamp for the same length of time.)

When the ignition is finished turn off the gas supply gradually so as to allow the combustion tube to cool off slowly and then shut off the oxygen supply and aspirate with air for ten minutes. Detach the potash bulb and prolong, close the ends with rubber caps and allow it to stand for five minutes, then weigh. The increase in weight multiplied by 0.27273 equals the percentage of carbon.

The potassium copper chloride shall be made by dissolving one pound of the salt in one liter of water and filtering through an asbestos filter.

Option No. 1.—While a pre-heater is greatly to be desired, as only a small percentage of laboratories at present use them, it was decided not to make the use of one essential to this method; subtraction of the weight of the blank to a great extent eliminating any error which might arise from not using a pre-heater.

Option No. 2.—The Shimer and similar crucibles are largely used as combustion furnaces and for this reason it was decided to make optional the use of either the tube furnace or one of the standard crucibles. In case the crucible is used it shall be followed by a copper tube ends cooled by water jackets. In the centre of the tube 3-16 inch inside diameter and ten inches long, with its shall be placed a disc of platinum gauze, and for three or four inches in the side towards the crucible shall be silver foil, and for the same distance on the other side shall be copper oxide. The ends shall be plugged with glass wool, and the tube heated with a fish tail burner before the aspiration of air is started.

Evaporate to about twenty-five c. c., add twenty c. c. concentrated nitric acid, evaporate until a film begins to form, add thirty c. c. of nitric acid (sp. gr. 1.20) and again evaporate until a film begins to form. Dilute to about 150 c. c. with hot water and allow it to cool. When the solution is between 70 degrees and 80 degrees C. add fifty c. c. of molybdate solution. Agitate the solution a few minutes, then filter on a tared Gooch crucible having a paper disc at the bottom. Wash three times with a three per cent. nitrate acid solution and twice with alcohol. Dry at 100 degrees to 105 degrees C. to constant weight. The weight multiplied by 0.0163 equals the per cent. of phosphorous in a one gram sample.

Briquetting of Fuels in British Columbia—Description of Pacific Coal Company's Plant at Bankhead, Alberta.

By G. J. Mashek.

(Written for the "Canadian Mining Journal.")

The briquetting of coal dust and refuse from coal mines and breakers has not made much progress in North America, especially Canada, the reason being that very good quality of natural coal is still obtainable on the North American continent at a reasonable price, and also owing to the fact, that most of the briquetting experiments in years gone by have been done with European machinery, which has reached such a state of perfection in Eurpose that the briquetting of European coals has been a successful commercial undertaking.

Many attempts have been made to briquette American coals with European machinery, but in all cases it has been a failure, principally owing to the fact, that this machinery has a small output; its first cost is high, and it requires a large amount of labor to operate it. Briquetting machinery to fill the requirements in this country must be practically automatic and must make a better and a more suitable size briquette than it is possible to produce with almost any European machinery. Its cost of operation and up-keep must also be low, and it must produce briquettes of suitable size. This is principally owing to the fact that briquettes in this country must compete against better natural coal than in Europe.

Briquetting of the breaker refuse and dust is only advisable on coals that are non-coking or have very slight coking qualities. Dust from coking coals can always be turned into coke at a lower cost than into briquettes.

With the increasing cost of production of prepared coal due to increasing wages, transportation and handling, and increasing population, the time when briquetting refuse coal mines in North America, especially in certain portions of British America, is a profitable undertaking has arrived.

The following is a description of a double unit briquetting plant put in by the Pacific Coal Company, at Bankhead, Alberta, to briquette the fines of Western anthracite coal, of which there are large deposits in the neighborhood of Bankhead. This coal is a free burning, fairly hard coal; but quite friable. In putting it through the breaker and preparing it for the market there is produced as much as 30 per cent. of fines below pea size, which was practically unmarketable, especially in view of the long railroad hauls to point of consumption. It was for this reason that a briquetting plant was installed after a long investigation into the subject by the officers and engineers of the company, both here and in Europe.

Figure 1, shows a general outline plan of the briquetting plant together with its location in regard to the breaker. This breaker was installed and operated sometime before the briquetting plant was built. Description of the general operation of the plant is as follows:—

The coal from the mines is elevated to the top of the breaker, where it is cracked and screened with the sizes distributed to the proper bins. The dust falls into bins, beneath which is placed the dust scraper conveyor as shown. This conveys the dust from the breaker travelling over the trestle to the dust bin of the briquetting plant.

In the bottom of the briquette plant dust bin there are two drag conveyors which feed out the dust to two 36 x 16 crushing rolls. After a thorough examination and tests have been made of the character of this coal, standard mineral crushing rolls were decided to be the best pulverizers or crushers. While a large portion of the dust brought from the breaker will pass through fine enough mesh of screen for briquetting purposes there still will be pieces of coal probably running up to 1-2 inch size which have to be pulverized in order to avoid their being crushed in the briquetting press and producing defective briquettes.

In briquetting any fuel it is essential that the material be reduced to the proper and uniform mesh in order to make a hard briquette. Some coals can be briquetted considerably coarser than others. The best results obtained with this particular coal is that all of it should pass through a 12 mesh screen.

The drag conveyor referred to above is operated by means of a variable speed counter-shaft so that the feed can be easily regulated. From the crushing rolls the

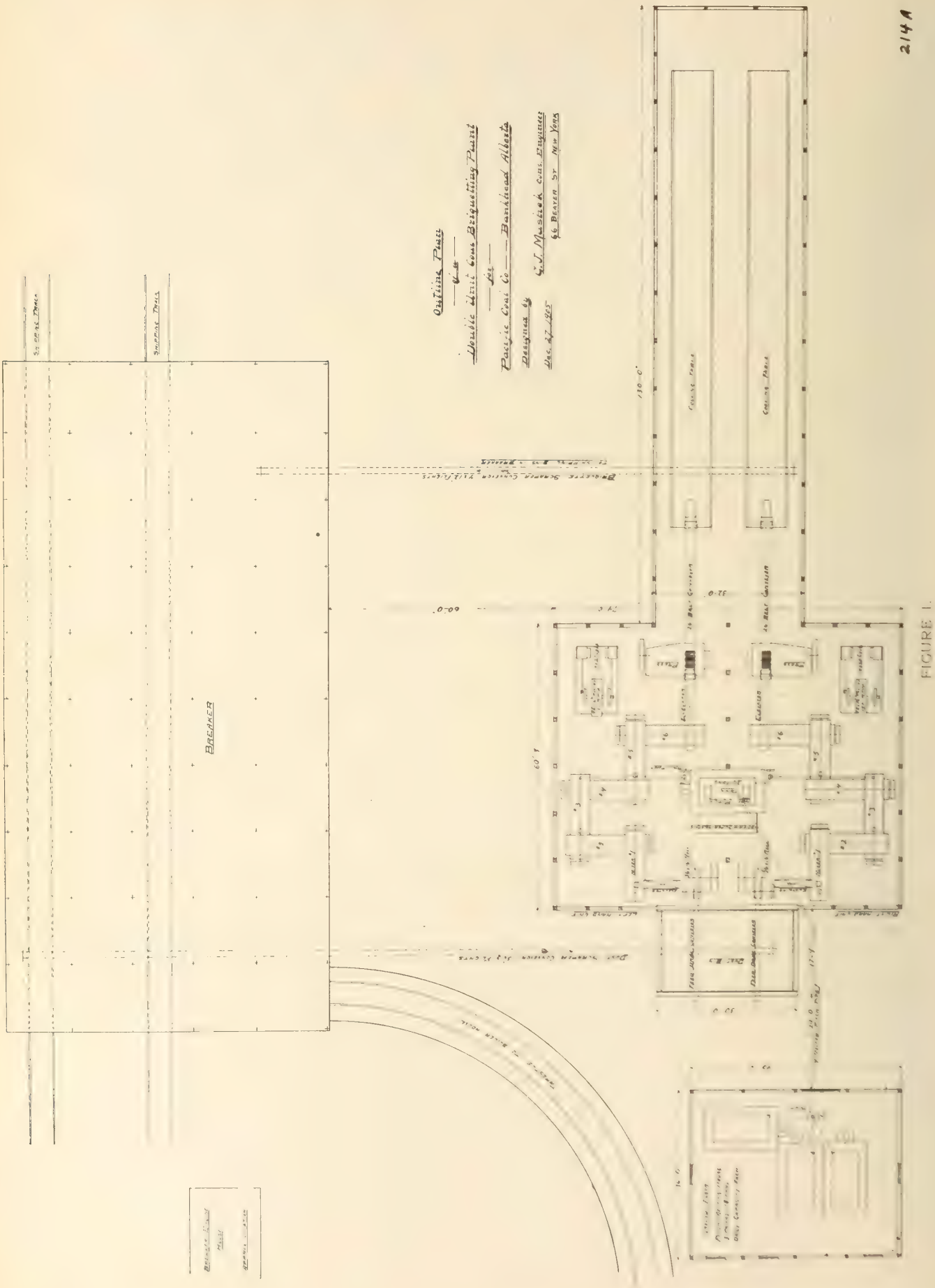

2141
Outline Plan
of
Double Unit Coal Briquetting Plant
for
Pacific Coal Co. — Bankhead Alberta
Designed by
C. V. Mashek C.E. Engineer
46 Beaver St New York
BREAKER
130'-0"
60'-0"

FIGURE 1.

material drops to an elevator which elevates it to mixer No. 1 standing 10 feet above the ground.

This plant is a double unit plant run by two separate engines using only one hot melted pitch tank for feeding the mixers. There are six mixers to each unit. They are all practically alike with the exception of a slight difference in pitch and shape of the blades in the different mixers. These mixers were first designed to use fuel oil for heating, allowing the products of combustion to pass through the coal; but it was found, before this plant was contracted for, that the cost of fuel oil would be about 14 cents per gallon in Alberta. Therefore a coal burning furnace was installed instead.

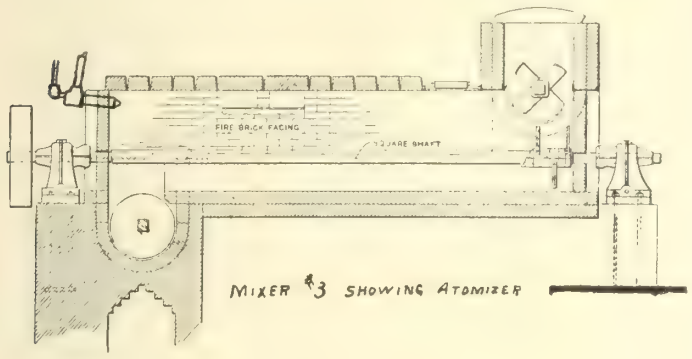


FIGURE 2.

It might be further said that these mixers are similar to concrete mixers. They are run at such a speed as to practically keep all the coal in suspension above the centre of the shaft of the mixer, and by passing the products of combustion directly in through the coal dust, the most efficient arrangements of imparting heat to coal are obtained. On account of the low specific heat of coal this step is necessary.

Mixers Nos. 1, 2 and 3, are used principally for drying and heating the dust, which must be brought up to a temperature of about 300 degrees F. At the lower end of mixer No. 3, the pitch is introduced. A section of Mixer No. 3 is shown in Fig. 2. With some change in the style and shape of the hardened steel blades, the other mixers are similar to this.

The pitch is delivered to this mixer by means of an atomizer as shown in Fig. 3. The object is to atomize the pitch into a vapour as it were, and have this vapour pass through the suspended material as it is kicked up by the mixer shaft with its blades, thereby coating each particle of the coal evenly.

If this theory had been correct there would have been no need of any additional mixers, as the coal would certainly then be in proper condition for briquetting. Early experiment with this apparatus brought out the fact that additional mixers are required after the pitch is introduced in order to make a thorough mixture, and one after another was added, until six mixers were placed in series. It was found advisable in plants erected in the United States to put in a type of pug mill blades in mixer No. 5, so as to break and spread out the balls formed by the pitch rolling in the dust.

Mixer No. 6 is only used for cooling the mixture, as it would be too hot to put in the briquetting press and make hard briquettes. In this mixer it is advisable to introduce a little hot water as the briquettes are in better shape when the mixture is slightly damp.

In order to make a good hard briquette of any coal it is absolutely necessary that the surface of the particles of coal dust be dry so as to allow the pitch to properly adhere to it. It may appear, if pitch is introduced into wet coal dust, that there is an adhesion, but it is so small that it makes briquettes weak and liable to disintegration in handling and during combustion, owing to steam being generated in the briquette.

It has been found by experience that if there are a sufficient number of mixers and the material is brought up to the proper temperature it is immaterial whether the pitch is atomized or just pumped in straight through a distributing pipe. In fact, in a plant running at a rate of about 12 tons per hour, the stream of steam from the atomizer enters the mixer with such force and in such

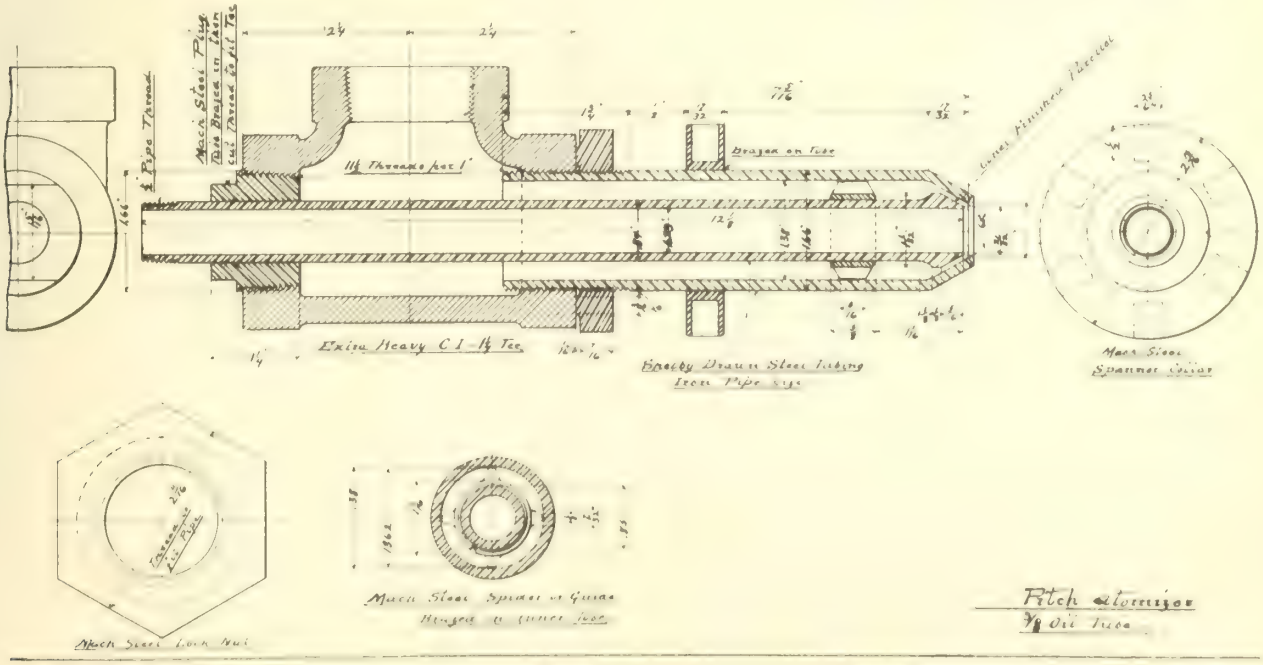


FIGURE 3.

volume that it has a tendency to blow back the coal dust and pile it up in a solid mass in the chamber, the mixer blades screwing it forward to the following one so that the need of atomizing in that case is entirely eliminated.

From No. 6 mixer the material drops into a continuous bucket elevator and is elevated to the top of the press hopper. This hopper has a capacity of about a half ton of mixture, and the material rests directly on the press rolls. The press is a modification of the Belgian type with the exception that it is made considerably stronger. All parts under strain are of steel. The gearing is made of cast steel with manganese bronze pinions, all having cut teeth.

(To be continued)

EXCHANGES.

Economic Geology, October-November, 1907.—An article of great interest in this number of *Economic Geology* is "The Weathering of Coal," by S. W. Parr and N. D. Hamilton. The writers conducted a series of experiments on small lots of nut, slack, broken lump and washed pea coal. The quantities used ranged from 10 to 20 pounds. It is pointed out that in storage plants with capacities of, say, 50,000 tons, deterioration of one per cent. means a loss of 500 tons. Also it is noted that deterioration would naturally occur at a higher rate in the small experimental lots than in commercial storage quantities.

The first series of tests was made as soon as possible after the mining of the coal. Here the writers lay great stress upon the prompt examination of samples to determine and record initial conditions.

The coal used was of small lump or nut size. Samples of one hundred pounds were subdivided in order to subject the same kind of coal to various conditions, as follows:—

(a) Outdoor exposure.

(b) Exposure to a dry atmosphere at a somewhat elevated temperature, ranging between 85 degrees and 120 degrees Fahr.

(c) Under the same conditions as (b), but to be drenched with water two or three times per week.

(d) Submerged in ordinary water at a temperature of approximately 70 degrees.

The conditions were continued through ten months. The results obtained are summarized thus:—

(a) Submerged coal does not lose appreciably in heat value.

(b) Outdoor exposure results in a loss of heating value varying from 2 to 10 per cent.

(c) Dry storage has no advantage over storage in the open except with high sulphur coals, where the disintegrating effect of sulphur in the process of oxidation facilitates the escape of hydrocarbons or the oxidation of the same.

(d) In most cases the losses in storage appear to be practically complete at the end of five months. From the seventh to the ninth month the loss is inappreciable.

(e) The results obtained conform in a general way to the experience of users of coal from large storage heaps.

The *Mining and Scientific Press,* December 28th.—This number contains an article on "Cobalt," by Mr. Frank C. Loring, of Toronto. Referring to value of shipments, etc., Mr. Loring writes as follows: "During 1907, up to October 1st, 10,300 tons of ore have been sold, for which possibly $6,000,000 has been received, almost entirely for silver. The district is now shipping approximately 1,000,000 ounces silver per month, as well as large quantities of cobalt, for which little is paid . . . Transportation and treatment charges are from $15 to $25 per ton, with deductions of 6 to 7 per cent. of the assay value of the silver. One smelter pays $20 per ton for ore carrying 8 per cent. cobalt. If ore is sold solely for cobalt 35 to 50 cents is paid per pound of cobalt, according to the percentage, with no allowance for silver."

The *Engineering Magazine,* January, 1908.—"Mining Developments in Nevada," by A. Selwyn Brown, appears in the *Engineering Magazine* for January, 1908. The article is a review of physical, not financial, conditions in Nevada mining regions up to the end of the year 1907. Up until 1900 Nevada had been looked upon as purely a silver producing State. The flooding of the Comstock mines in the early eighties and the closing of other silver mines had sadly depressed the whole industry. The Tonopah gold mine, discovered in 1900 in a remote corner of Southeastern Nevada, was purchased in 1902 by Philadelphia capitalists. Throughout the period 1904-7 a steady rush of prospectors set in. In 1905 Goldfield, Bullfrog and Manhattan camps were the centres of investment and financial activity. The present stringency has disorganzed the district badly. Mr. SelwynBrown, however, does not view the situation uncheerfully.

Many mountain ranges trending generally southwest, and having an elevation of about 500 feet, traverse the Tonopah and Goldfield districts. Artesian wells supply water to the large milling and cyanide plants.

Geographically, volcanic action has played a large part in the structure of Nevada. The volcanic rhyolites, andesites and porphyries are most important to the miner. Lead and copper lodes, however, occur in limestones and other sedimentary rocks. The whole of Nevada is mineralized, and many different minerals are mined. Government and companies' returns do not correspond, but the following total is the result of careful compilation. The total gold and silver production of Nevada from 1850 to 1907 is $1,033,350,000. The Goldfield mines this year from January 1st to November 23rd have shipped 112,081 tons of ore, valued at $11,208,100. Tonopah mines, worked in a more conservative manner, have yielded about $10,000,000. Other fields are credited with $4,000,000. The total for Nevada silver and gold for the year will be about $26,700,000. In nearly all Nevada ores the ratio of silver to gold is about two to one.

TONOPAH.

The Tonopah mining district is comprised in an area of about seven miles square: the whole of which is mineralized. It is probable that future work will show that the vein systems successfully worked on Lone Mountain, 17 miles west of Tonopah, and at Ray, 12 miles north of Tonopah, are extensions of the Tonopah systems. On the six first discovered mines, the Tonopah, Montana,

Midway, Belmont, North Star, and Tonopah Extension, the principal development work has been done.

There are six formations overlying the lower ore-bearing formations. As shafts have to be sunk several thousand feet before cross-cutting for a vein, scientific acumen and business sagacity are called into play.

The Tonopah mine, in which the first discovery of mineral was made (May, 1900), was also the first successful mine. The vein outcropped for a short distance on the surface and was sufficiently rich to bear all expenses of shipping to smelters in California and Utah. The mine is now 1,000 feet deep. The lateral developments exceed five miles in length. Ore blocked out for stoping is valued at $20,000,000. A milling plant within 12 miles treats 2,000 tons of this ore weekly.

On the Montana mine, where gold was next discovered, the vein is covered by several hundred feet of rhyolite. The shaft was located and sunk at a point accurately calculated to be on the line of strike of the vein eastward. The Montana ships 1,000 tons of ore weekly.

There are numerous other mines hardly developed to the producing point. Several are shipping, but in less quantities than the Montana.

The Tonopah is not a poor man's field. The ore-bearing andesite formations are covered by several hundred feet of rhyolite and other volcanic rocks, and shaft sinking is expensive. The veins are large, regular and uniformly rich at depth. Electric power is obtainable from the generating stations utilizing the hydraulic power of streams in the Sierra Nevada. A number of important mining centres are being developed near Tonopah.

GOLDFIELD.

Gold was accidentally discovered at a watering place in the desert 20 miles south of Tonopah in 1903. In 1905 gold to the value of $3,500,000 was obtained from nine of the principal mines. Last year the production was $10,000,000, and this year it is estimated at 127,000 tons of ore, valued at $12,700,000. More than eighty important mines are in course of development. Many of the mines have been handled by lessees. Speculation in stocks has been most pronounced. Stock sales during 1907 totalled $25,162,567.

BULLFROG.

Bullfrog goldfield is situated eighty miles directly southwest of Tonopah. Several important mines have been delevoped. Topographically it is similar to Tonopah and Goldfield.

The Western, Northern and Eastern fields are all active.

Nevada promises to become the leading gold-producing State before long.

The *Mining Journal* (London), December 21st, 1907.—Reviewing a St. Petersburg despatch, the *Mining Journal* takes up the question of exploiting Russia as a market for mining machinery and supplies. As a result of mining engineers resident in or visiting Russia the *Mining Journal* comes to the conclusion that if Russian conditions and idiosyncracies are carefully studied and responsible agents appointed who shall have an absolutely free hand, then the chances are excellent. A hint is given that the matter of "tips" must not be overlooked. The market for gold mining machinery in Russia is free. The highly primitive conditions under which gold is mined in Russia and the favorable light in which British manufacturers are regarded are indicative of a rapid extension of trade.

The *Chemical Engineer*, December, 1907.—A short article in this number outlines a process for making Portland cement from materials high in magnesia. Magnesia has heretofore been regarded as having a most deleterious effect upon cement. The possibility of using limestones high in magnesia will bring vast new fields into commercial prominence.

The process, for which a patent has been granted to Richard K. Meade, of Nazareth, Pa., consists in mixing with "cement rock" sufficient high magnesian limestone to bring the lime and magnesia in the mixture up to the proper ratio to the silica, iron oxide, and alumina. The mixture is then ground, burned, and a small percentage, preferably from 1 to 10 per cent. by weight of calcium chloride is added to the clinker and the mixture ground to the requisite fineness. Calcium chloride should be added in the proportion of 2 to 8 of magnesia.

Gypsum or plaster of paris may be added, if necessary, to regulate the set. Calcium chloride, however, is better. The calcium chloride combines with the free magnesium oxide in the cement when the latter is mixed with water, and forms with it an oxychloride compound of great cementing properties. The resulting mixture of Portland cement and oxychloride cement has greater strength and binding properties than Portland cement itself.

Personal and General.

Mr. George H. Dickson, of the International Coal & Coke Company, Coleman, Alberta, is in Toronto.

Mr. H. M. I. Weir, C.E., recently of Cobalt, passed through Toronto on his way to his home in Brantford.

Mr. Milton L. Hersey, of Montreal, visited Toronto on the 8th inst. Mr. Hersey has left for London, England, where he has been retained to give expert chemical evidence in an important case.

INDUSTRIAL NOTES.

Hearing of the important changes that the B. Greening Wire Company, Limited, of Hamilton and Montreal, had made in their premises lately, we thought it would be of sufficient interest to publish a cut of these buildings as they appear to-day. Anyone who has seen these works within the last few years prior to last May will recognize that a vast improvement has been made; in fact that a portion of the works altered would not be recognized. These premises now occupy portions of three seperate blocks.

On the southwest corner of Queen and Peter streets the firm erected a new weaving mill 260 by 130 feet, and in order to get light to this large building they adopted the saw-toothed roof, making this one of the best factory buildings in Hamilton. Here are installed all the heavy looms from the Napier street weaving mill, together with several additions, amongst which are the additional screen cloth looms installed this year. It was the intention to remove the old screen cloth plant to this building, but the firm felt they could not afford the time so that will remain where it is until after next season's trade, when it is the intention to take the temporary end out of the new weaving mill and build on an addition sufficient to accommodate all of the weaving plant. As stated above, the firm has added many new looms of practically all types, so that they are now in a position

to meet any demands that may be made upon them for all grades of wire cloth for years to come.

The old weaving mill on Napier street is to be added to the wire mill, as the increase in the weaving plant will require so much more wire. The space between the old weaving mill and the wire will on Napier street has been built up and the cleaning room for the wire mill containing all modern improvements is installed here.

poses, car ventilators, etc. They make steel wire rope for passenger and freight elevators, derrick, and contractors' use, mining purposes and transmission of power, perforated sheet metals in brass, copper, steel and iron for grist mill machinery, burning purposes, grain cleaning machinery, etc. Cirmped steel wire bonding for concrete work. They issue catalogues for the different branches of their business.



The firm report business quite brisk, especially in special weaving, to which they are devoting much time, attention and enterprise in installing looms to weave cloth of all degrees of weight and fineness of mesh.

Besides manufacture of wire this firm makes all kinds of wire cloth from the heaviest used for such as locomotive stacks, refuse burners for saw mills, to fine wire cloth for flour mills, office window blinds, mining pur-

Some years ago the firm found that its shipments to the Eastern Provinces were becoming so great that it was almost impossible to supply the demand from the head office, so a branch was opened at 422 and 424 St. Paul street, Montreal, under the management of J. H. Hanson. Still the trade increased, so that two years ago it was found necessary to take in the premises adjoining to provide room for the stock.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

GLACE BAY.—At their meeting in New Glasgow, on the 27th December, the Grand Council of the P. W. A. decided to ask the Minister of Labor to appoint a Board of Conciliation and Investigation, under the Lemieux Act, in the matter of the new schedule of rates that the Dominion Coal Company have announced their intention of putting into effect. The application to the Minister of Labor was despatched on the 31st December accompanied by a statutory declaration by the Grand Master and Grand Secretary of the P. W. A., that failing the appointment of a Board, a strike will take place if the Coal Company persists in paying the revised rates. To-day, the 3rd January, the Coal Company have posted notices at all their mines giving the new rates for mining and the new price for workmen's coal, which become effective on Monday, the 6th January. The new schedule gives an increase to every class of workmen employed at the mines with the exception of the men working in pillars and the machine men in narrow work. This latter class is a particularly well paid one, as the leading work is usually given to good men. The new rate for pillars, although reduced, is still a good one, and there will not be any difficulty in getting men, because the pillar men will still be able to earn higher wages than his fellow in rooms. The Coal Company are making it very clear that they intend to stick to their original promise that the new schedule should involve no reduction in the aggregate wages, and the whole of the money gained by the company through the cut in the pillar rate and the increased price of workmen's coal is to be given back to other classes of men, namely day laborers, mechanics and loaders. Indeed the net result of the schedule will be an increased [illegible] for the mines as a whole. The Coal Company state very definitely that the pillar rate is one which they refuse to discuss. After careful investigation and consideration they have come to the

conclusion that it will be to the advantage of the rest of the workmen to reduce the pillar rate, and in this particular their policy is fixed. The increased price of house coal will be compensated for by the increases in the wages already referred to. No further developments are likely to occur until the matter has been considered by the Minister of Labor.

NEW BRUNSWICK.

ST. JOHN.—Those interested in the Minto coal mines—the richest of their kind in New Brunswick—have been favored with an exceptionally good year.

One difficulty, however, has been the scarcity of labor. Every available man has been employed and while the output has shown no very marked increase, it is larger than usual. The labor difficulty has been relieved to some extent by hard times in other places, and men are now more plentiful.

Each shaft has averaged from twelve to sixteen men during the past year, but the gangs could be increased to thirty-five or even forty, which would practically double the output, thus better enabling the operators to meet the demands, which at present they are unable to do.

Nine shafts have been in operation throughout the year, several of them having produced an average of some forty tons a day each.

A short time ago F. M. Tweedie succeeded in securing the John McDonald property and has completed a new shaft, which will be opened in the near future. G. H. King has also completed a new shaft, which will be opened up in a few days. The latter is on the Minto mine and addition of these two will make eleven shafte in operation and others will be added during the year.

When the price of coal advanced, last autumn, the operators gave a similar advance in wages to their employees. The men who formerly received from $1.50 to $2.50 per day are now averaging from $1.75 to $3.00 per day. At this point, it may be added that the high rate of wages, together with hard times have probably had their influence in bringing more laborers to the mines.

It is safe to say that the coal market was never better than at present. The run-of-mine brings $2.50 per ton f.o.b. mine, which the operators regard as very satisfactory returns. The I. C. R. has taken a large quantity of the coal, and there is a brisk and steady demand for it from other quarters, so that the operators are unable to fill their orders; but they hope, during the present year to increase their output. It is much easier to send out the coal now, than it was a year or two ago, as many important improvements have been made on the N. B. Coal and Railway line. Throughout the year the service has been satisfactory and the road is at present in excellent condition.

The village of Minto is progressing. The population is increasing and a number of new buildings have been erected. G. H. King has completed six new dwellings, the Northfield Coal Company, of which Hon. James Barnes is manager, have put up eight or ten cottages, and three more have been erected by the Welton brothers.

The Rothwell Coal Company, recently completed a new shaft, which produces twenty tons of coal per day. It has also put up four dwelling houses and a small general store.

Considerable interest has been aroused by a mineral development near the town of Woodstock. The existence of iron ore has been known for some time, and it was once successfully worked, but it remained for a number of Carleton county people, headed by High Sheriff William A. Hayward, to demonstrate the fact that across the river, is a bed of rich copper, carrying gold and other metals.

Under the name of the Cobba-Sexton Mining Company, the parties referred to have already expended several thousand dollars in developing their areas, and are much gratified with the assays submitted from various places.

A number of others have taken adjacent holdings. The first gold found in New Brunswick was taken from these mines..

The five granite concerns at St. George, viz., Tayte, Meating & Company, the Utopia Granite Company, O'Brien & Baldwin, Epps, Dodds & Company and the Bay of Fundy Granite Company, who manufacture red, grey and black granite for building and monumental purposes, have had an exceptionally prosperous year. The introduction of modern pneumatic and other up-to-date machinery has tended to lessen the cost of production and rough hand labor, and the manufacturers are thus in a better position to compete for work than in the past.

ONTARIO.

COBALT.

Nipissing.—Mr. Drummond, the manager of the Nipissing mine, is leaving Cobalt for Salt Lake City, where he will be located permanently. He will be succeeded in the management of the mine by Mr. Parks, his present assistant.

On December 16th, the Board of Directors of the Nipissing Mines, Limited, declared a quarterly dividend of three per cent., payable January 21st, 1908, to shareholders of record of December 27th, 1907. Transfer books closed on December 27th and remain closed until January 22nd, 1908.

King Edward.—Mr. McCaskill, the manager of the King Edward mine, has taken over the management of the Colonial as well. Mr. Coombs, the manager of the latter mine, has gone to New York.

Cobalt Majestic.—The recently organized Cobalt Majestic Silver Mining Company, has taken over all the property of the Abitibi & Cobalt Mines Company, which consists of 320 acres. They have also acquired control of the Empress Cobalt, and have purchased a claim in the Township of James.

O'Brien.—On January 7th, a three inch vien of native silver and argentite, carrying high values, was struck at the 100 foot level, in the East drift from the main shaft. This is a continuation of the main vein.

Temiskaming.—A new, very rich, but narrow, vien has been struck at the 200-foot level. This is thought to be the extension of the big vein.

Mr. Floyd Harman, the superintendant, has resigned.

Silver Leaf.—The shaft on what is known as the "New Vein" on the property, is now down 55 feet. The values are very better than at the surface. There are 5 pay streaks of from 2 to 6 inches in width of high grade ore.

A second car of ore is now ready for shipment, about 12 tons being No. 1 and the balance No. 2.

Returns have not yet been received from the car shipped in December.

Buffalo.—In illustration of the values in some of the rich Cobalt veins, a vien two inches wide, in the Buffalo mine, is yielding about $300 per foot in the drift, 7 feet high. Figuring on two and one-half feet per day, two shifts would produce $750 worth of ore at a cost of about $12 per foot.

Anima Nipissing Lake.—The Rex Argentite Mining Company, organized by New York capitalists to operate in this section, have recently purchased through Capt. Jeffrey, late superintendent of La Rose mine, three 40 acre claims on the northeast arm of Lake Anima, Nipissing. A shaft has been sunk 30 feet on a vein which shows calcite, copper and iron on the surface. At 27 feet very good silver values were found. President Dougherty of the company, who inspected the property early in this month, has decided that the values discovered justify the installation of machinery and a plant will be brought in over the ice this winter. The property is situated about 9 miles west of Latchford.

In comparing the production of 1907 with 1906, there are many things to be taken into consideration. The strike caused a material reduction in shipments, and during the last 3 months of 1907 the drop in the price of silver and the difficulty in selling the ore has resulted in a curtailment of production and shipments. Mine managers are instructed to produce only sufficient ore to meet running expenses and pay dividends. Another factor in the reduction of tonnage is the fact that nearly all the large shippers are either concentrating their ore or have arranged to do so. This will naturally result in a great reduction in tonnage and a corresponding increase in value shipped. There are now six concentrating plants in the camp, either in operation, or well on the road to completion. Two of them are customs concentrators, which will handle the output of the mines not equipped with plants of their own. The total shipments from Cobalt in 1907, were 14,040 tons. La Rose mine heads the list with 2,853 tons, the Coniagas next with 2,399 tons and the Nipissing third with 2,394 tons. There were 25 shippers on the list in 1907, out of which 18 or 19 may be properly classified as shipping mines, which can be counted on as factors in the production of 1908. There are also a number of properties that have good prospects of becoming shippers, and at a conservative estimate there will be at least 25 or 30 shipping mines by 1908.

In 1904 Cobalt produced 158 tons, valued at $136,217; in 1905 Colbalt produced 2,144 tons, valued at $1,473,196; in 1906 Cobalt produced 5,129 tons, valued at $3,900,000.

The shipments for each mine in 1907, are as follows:—

	Ore in lbs.
Buffalo	2,208,820
City of Cobalt	101,280
Coniagas	4,798,710
Cobalt Central	101,360
Colonial	74,250
Drummond	108,920
Foster	611,803
Green Meehan	196,780
Hudson Bay	243,170
Imperial Cobalt	37,530
Kerr Lake	644,800
King Edward (Watts)	62,250
La Rose	5,706,875
Mckinley-Darragh	1,407,935
Nova Scotia	493,000
Nipissing	1,407,935
O'Brien	2,666,360
Red Rock	91,443
Right of Way	258,220
Silver leaf	93,618
Silver Queen	957,157
Trethewey	1,710,438
Townsite	234,278
Temiskaming	430,611
University	61,383

Estimated value, $5,650,000.

ALBERTA.

COLEMAN.—All the mines along the Crow's Nest Pass have been idle for the Christmas and New Year's holidays. Although large numbers of men were to be seen in the various camps, things were very quiet. Some of the mines complain that the men are inclined to take a few days longer than the regular holiday, but on the whole the men have reported for work fairly well. The Lille mine, near Frank has not resumed work since the holidays, and the Frank mine of the Canadian-American Coal & Coke Company is also shut down. There is a rumor that trade is dull, but up to the present the real reasons for the shut-down have not been officially announced.

TABER.—The three Boards of Conciliation held in connection with the labor troubles, at the Canada West Coal & Coke Company, the Duggan & Huntrods Company and the Domestic Coal Company, all of Taber, have reported to the Department of Labor, Ottawa.

Judge Stewart, of Calgary, was chairman of all three boards, and the main question at issue were the same in each case. About 250 men were affected. All the points in dispute have been amicably settled between the three companies and the United Mine Workers of America. The companies concede express recognition of the union and accept the check-off system, whereby the union dues are deducted from the workmen's wages and paid over to the union officials. There will be no change in the hours of labor and the companies will pay monthly by cheque.

There is now more trouble brewing at Taber between the Marsh mines and their employees. The men have given notice to terminate their agreement with the company and have asked an increase in wages.

So far no application has been made to have the matter arbitrated under the Lemieux Act, but it is stated that the company intend to apply to the Minister of Labor to have an Arbitration Board convened.

STRATHCONA.—As a result of the Conciliation Board meeting under the Lemieux Act to enquire into the dispute between the Strathcona Coal Company and their employees, the questions in dispute have been amicably settled. The miners will receive an 8-hour day and an increase of wages. The miners who are on contract work and are paid by the car, will now receive renumeration at the rate of about $1.00 per ton for the coal they dig. The Board was composed of T. L. Otter, coal merchant, representing the operators, F. H. Sherman, president of the United Mine Workers, of America, representing the men and G. S. Montgomery, chairman.

EDMONTON.—General Manager M. H. McLeod, of the Canadian Northern Railway, states that there is no shortage of coal in the towns along the line east of Edmonton this winter. The Canadian Northern Railway Company are conducting experiments with a special design of smoke-stack for the use of lignite coal on their locomotives. At present this coal is forbidden by the Railway Commission to be used during the summer months.

These new smoke-stacks are designed with a view to spark prevention, as the lignite coal when burned in a locomotive firebox gives off a great number of sparks, thus constituting a danger of prairie fire on some sections of the line.

It is expected that the Grand Trunk Pacific will have their line to Edmonton in operation next fall, but as this railway will be pushed right on the mountains it is not likely that they will use much of the lignite and semi-bituminous coal from the Edmonton field. As soon as the line is completed to the mountains, they will be in a position to obtain a good supply of high grade steam coal.

It is stated that bituminous coal fields of great extent have been discovered on Bear River, in Northern Cariboo, B.C. These are on the main line of the G.T.P. and are 100 miles north of Barkerville. Twenty claims of 640 acres each have been staked by Joseph Wandle and B. A. Lascelle.

This new coal field may yet prove to be of as much importance as the great Crow's Nest Pass coal field. There is also large coal deposits in the Yellow Head Pass, through which the Grand Trunk line runs when it leaves the prairie country.

CALGARY.—At a public meeting in Calgary the Hon. W. H. Cushing, Minister of Public Works, for the Province of Alberta, stated that in the session of the legislature, which opens in a few weeks time, measures providing for a legal working day of eight hours in coal mines, the payment of indemnities to miners injured in coal mine accidents or, in the event of death, compensation to their dependents, will be introduced. Mr. Cushing said:—

"The coal operators have already granted an eight-hour day to their employees. The effect of the proposed bill will be to give this arrangement legal status. The principal measure will provide for the compulsory payment of indemnity to coal miners injured while pursuing their ordinary avocation. In the event of death the compensation will be paid to the nearest relative. The bill will be modelled on an enactment which has worked well in practice in England. Our Government takes the view that the injured or survivors should not be compelled to fight long drawn-out legal battles in the courts in order to secure damages."

The measure will be a compulsory one.

Continuing, Mr. Cushing said, "I do not anticipate a fuel famine in the new provinces this winter, although the coal reserves are not large. The weather is exceptionally mild and the remainder of the winter promises to be favorable. This is based on former experiences. Why, at this time last year we had experienced over two months of inclement weather. There has been some talk of a shortage of cars for hauling the coal from the mines, but I don't know what truth there is in these reports. Thus far we have not had any complaints."

GENERAL MINING NEWS

NOVA SCOTIA.

TORBROOK.—At the Annapolis mines, Torbrook, No. 1 shaft is producing two hundred tons of iron ore per day. No. 2 shaft, a new one sunk on a rich hematite vein, is producing sixty tons of ore per day from development work only. The water power is to be harnessed at Nictaux Falls next summer.

ONTARIO.

OTTAWA.—An order-in-council has been passed regarding the regulations governing the issue of leases to mine for coal within the Rocky Mountain park and substituting therefor new regulations. The duration of the leases is fixed at twenty years, but may be terminated by the consent of the Crown for non-fulfillment of conditions. The ground rent is fixed at one dollar per acre. It is provided that the lessee shall commence active mining within one year. In addition to rent, a royalty of five cents per ton will be collected, and default of payment, within thirty days shall be followed by the cancellation of the lease. The minimum leased to one person is 160 acres and the maximum 640 acres.

The Canadian branch of the Royal Mint was formeraly opened on the afternoon of January 2nd. The first silver half-dollar was struck off and presented to Earl Grey, the Governor-General. The first copper coin was presented to Countess Grey. A distinguished gathering took part in the ceremonies. The officials of the mint are: Dr. Bonar, deputy master; Mr. A. H. W. Cleaves, superintendent; Mr. J. A. Cleaves, assistant superintendent; Henry Ewart, assistant to the superintendent; Mr. A. Pearson, chief assayer; Mr. C. N. Entwhistle and Mr. William Groves, assistants; Mr. John Roe, chief clerk; Mr. P. S. Roe, chief of mechanical department. Visitors after January 13th will be shown through the mint by Mr. H. H. Seguin.

COBALT.—Inspector E. T. Corkill is investigating the recent fatalities due to dynamite explosions. The inquests in each case revealed carelessness on the part of the victims themselves.

It is reported that the last car of ore shipped from Trethewey will realize $40,000.

The Foster Mining Company has a car of high grade ore and the Watts mine has two cars of good ore ready to be shipped.

Referring to a paragraph appearing in the last number of the CANADIAN MINING JOURNAL regarding the sampling of the ground in dispute between La Rose Mining Company and the Right of Way Mining Company, the engineers who made the examination were all Canadians. The excellent work performed was done by Messrs. J. B. Tyrrell, R. W. Brock, A. A. Cole, W. Askwith and A. Wilson.

ALBERTA.

The work of reopening the Breckenridge & Lun Colliery, under lease to the Alberta Fuel Company, is making progress, and the daily tonnage is about 100, and this is to be increased steadily. The colliery is equipped with a plant costing $70,000, and the product is turned out in excellent shape.

The decision of the C.P.R. to permit its cars to run south of the international boundary when loaded with coal, will materially improve conditions in Alberta coal regions.

It means that during the next five months the Lundbreck collieries will be occupied in supplying fuel to the district and that the output will be larely increased. Heretofore the markets south of the border have been compelled to depend upon foreign cars in transit westward to be loaded with lumber and other products for eastern shipment. The new policy will enable the Alberta mines to fill orders for coal that have been piling up for two months.

The Galbraith Coal Company's new plant has enabled the colliery to fill many orders for the Canadian market, and the pressure from that part is materially relaxed, although orders for more than 100 cars are unfilled. It is expected that by the end of December the bulk of the orders in hand will be filled.

On the Alberta Coal & Coke Company's property, south of the Galbraith areas, another of the parallel seams extensively developed on Galbraith ground has been opened. The Alberta Company now has seams 14 and 15 feet in thickness respectively, and at an interval of 180 feet. The coal is indentical with that in the Galbraith seams—hard, clean and bright. The present openings are only 3,000 feet from the main line of the Crow's Nest Railroad, and it is planned to establish permanent workings at or near this point, which can be reached with a spur track having a slight gradient.

BRITISH COLUMBIA.

BARKERVILLE.—The gold yield of Cariboo for 1907, is expected to show an increase of about one-third over the 1906 yield. During the hydraulicking season this year there was a heavy downfall. This together with the working of three properties, unworked in 1906, will explain the better results. The three properties were the Lowhu Creek, Forrest Rose and Nugget Gulch hydraulics.

The Bear hydraulic, on Cunningham will probably wash 500,000 cubic yards during 1908, and the Russian Creek hydraulic will become a producer.

CRANBROOK.—Placer ground on Perry Creek has recently been purchased by the Illinois Steel Company. The reported price is $900,000 for nine-tenths, the former owners retaining one-tenth. A flume four-foot square in section conveys the water of Perry Creek a distance of four miles, whence it drops 600 feet at a sharp angle through cast-iron pipes. A pressure of 300 pounds is developed at the bottoms.

PHOENIX.—On December 28th there were from 75 to 100 men at work at the Granby mines. Applications have been received from possibly 250 others. According to Mr. O. B. Smith, the superintendent, full operations will be resumed in a few days.

as soon, that is, as the big 60-drill compressor is in running order. Shipments of ore were not expected to begin until after New Year's day.

The Venus mine in the White Horse district is said to have been bought by Mackenzie & Mann. It is a gold and silver property. The price reported is $60,000.

On Christmas eve it was announced that the Grand Forks Smeltermen's Union No. 180 and Phoenix Miners' Union No. 8 had definitely accepted the new wage scale and had arranged to resume work at the Granby smelter and mines. The result of several conferences between Mr. Hodges, local manager of the Granby Company and the representatives of the men, was that the vote for the new scale was declared unanimous. Referendum votes in Phoenix had resulted favorably, in Grand Forks unfavorably.

ROSSLAND.—The Trail smelter has just completed a shipment of 250,000 ounces of silver to the new Canadian Mint, at Ottawa. The Trail bar silver is 999 fine. This is beyond the most rigid requirements of the mint. The requirements of the mint will be about 1,000,000 ounces per annum. The Consolidated smelter can produce twice that amount.

VICTORIA.—In the absence of official reports the following notes on production are of interest.

The Wellington Colliery Company, on Vancouver Island, has produced about the same tonnage as during 1906, namely 800,000 tons of coal and 10,000 tons of coke. This year prices have been higher.

The Western Fuel Company, at Nanaimo, have probably an increased output over 1906 of 100,000 tons.

About 4,000 tons of lead (practically the amount produced in excess of Canadian requirements) has been exported in ore, principally to Europe.

The gold production of Atlin will be about the same as last year; that of Cariboo is less.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

A question has been raised as to the advantage of the hot blast in pyrite smelting. Since the invention of the hot blast in 1828 air has been supplied to iron smelting furnaces at a temperature varying from 570 degrees F. to 1,472 degrees F., with the result that the consumption of coke in the larger furnaces now used, has been reduced from about 8 tons per ton of iron produced to about 1 ton, 12 hundredweight. The undoubtedly beneficial results of the hot blast in iron smelting have led to its general adoption in other branches of metallurgy. In pyrite smelting it is generally regarded as necessary, but L. Parry, A.R.S.M., in a letter to the "London Mining Journal" adduces strong arguments against this view, contending that with the necessary skill as good running may be made with cold blast as with hot blast, even in partial pyrite smelting, and with probably better concentration. His views are supported by experience at Mount Lyell, Australia, where the hot blast has been abandoned.

It is stated that Messrs. Baldwins, Limited, of Stourport and South Wales, have secured a controlling interest in the Beaufort Tinplate Works, Morriston, comprising nine mills, which employ about 400 hands. They are among the best situated in the Swansea district.

At the Carn Brea Tin mines, Cornwall, the lode recently cut into at the 125-foot level, north of former workings and west of the cross course, indicates great possibilities, as the upper levels are developed in unexplored ground. Forty tons of stuff averaged 72 pounds of tin.

George McCulloch, formerly chairman of the Broken Hill Proprietary Company, died in London December 12th. The accidental discovery of this famous Australian mine in 1883, when Mr. McCulloch was manager of a sheep station, was the beginning of his mining career, in the course of which he acquired a large fortune. He devoted much of his wealth to the accummulation of a fine art gallery.

RUSSIA.

A Russian syndicate is boring for naphtha near Kertch in South Russia. Four holes are being put down, one having reached a depth of 100 metres and naphtha is expacted soon.

From the mines of the Magnesite Company in the Uphim Mountain district there were produced in 1906, 1,459,374 pounds of magnesite.

Attention is being drawn to the mineral wealth of Eastern Siberia, which abounds not only in iron deposits, but in timber and coal for fuel. There is magnetic ore at Myssoff, Baikal, and in the upper Lena district, uematite iron deposits near Iliksin with 60 per cent. metal, as well as 57 per cent. iron pyrites about 300 versts from Irkutsk by water, in addition to other deposits of value. The great want of Eastern Siberia, the population of which has increased very rapidly, is a metallurgical industry.

The Statistical Bureau of the Council of Mine Owners of Southern Russia recently published data covering the first six months of 1907, from which it appears that the yield of pig iron amounted to 51 million poods an increase of 3 million poods over the corresponding period of the previous year and the output of semi-manufactured iron to 40 million poods, an increase of 4 million. The increase is explained by the fact that the Russian mine owners have begun to export to foreign markets. The number of workmen in all metallurgical enterprises was 51,264 men in June last as compared with 41,152 in June 1906.

AUSTRIA-HUNGARY.

The Hungarian Government has decided to purchase a number of coal mines and has already acquired in the valley of Almas a coalfield 207 kilometres in area. In Croatia a mine producing 100,000 tons of coal and with a capacity for a much larger yield has been acquired and negociations for the purchase of an extensive coal deposit at Ormos in the Borsod district are in progress.

SPAIN.

A company is being organized in France to work the arsenic and gold mines of Carballino in the Province of Orense, the analysis of ore giving 40 per cent arsenic and 73 grammes of gold per ton. The ore will be shipped to Gonfreville, near Havre for treatment.

The law drafted by the Spanish Minister of Agriculture regarding mines, creates a commission of officials from the Finance Department, whose duty it will be to fix and publish yearly the value of minerals with a view to the tax of 3 per cent. The Government will also bring forward a scheme for the compulsory expropriation of mines.

UNITED STATES.

The Nome Mining Company, of Nome, Alaska, intends to begin next June to operate a dredge of the capacity of 5,000 cubic yards per day, the largest in that part of Alaska.

The Elmore vacuum process is being tested experimentally at the works of the Empire Zinc Company, Canyon City, Colo. An Elmore plant has been installed at the Marion mine, Usc, Colo., and the Union Copper Company is putting one in at its mine in

North Carolina. The process is likely to receive extensive trial in cases where it appears suited to the ore.

A large low grade vein has been discovered in the Montana Tonopah mine at Tonopah, Nevada, the 760-foot level. The ore-body is 30 feet in width and of milling grade. The discovery is regarded as likely to encourage other mine owners to make deep explorations.

The year 1906 witnessed a marked revival of the manganese industry. The output was 6,921 long tons, valued at $88,132; an increase of 2,803 tons in quantity and $51,918 in value over 1905.

More new mines were opened on the Mesabi iron range, Mich., last year than during any previous twelvemonth. The number added to the list was 21 making an approximate total of 120 on the range, of which, however, upwards of a score are not in operation. Seven of the new mines belong the U.S. Steel Corporation and four to the Republic Iron & Steel Company. Shipments of ore from the range during 1907 amounted approximately to 27,-260,000 tons.

The Old Town mine, one of the early large producers of Gilpin County, Colo., which is credited with a total yield of gold to the value of $1,787,000 above the 15th level, has been connected with the Newhouse Tunnel by a lateral of 4,300 feet and a shaft of 2,186 feet.

Mine owners of Pioche, Nev., cut wages on January 1st, the reductions in some cases amounting to 20 per cent.

SOUTH AFRICA.

Statistics issued by the Mines Department of the Transvaal give the value of the mineral output for October, exclusive of diamonds, as £2,439,513, made up as follows: Gold, £2,352,337; silver, £7,779; coal, £66,530; base metals, etc., £12,867. The total production for September was £2,375,338. The number of camps in operation on the Rand was 8,824, the same as the previous month. Three thousand Chinese had been repatriated during the month, their places being taken by colored labor. The number of employees was as follows:—Whites, 19,349; colored, 143,187; Chinese, 44,365.

The Witwatersrand Deep mine is adding 25 stamps to its present equipment, weighing 1,400 pounds each, which will increase its crushing capacity to about 450,000 tons per year. The New Kleinfontein Company will add 20 heavy stamps to its plant, the Ferreira Deep is erecting 40, and many other installations are in process or being arranged for, the total number of new stamps to be erected being 705.

What is regarded as one of the most important discoveries of copper in South Africa has been made in the Tete country, near the Zambesi. A mining concession 417 miles square has been secured by Messrs Lawley & Cleary. Native copper and ore carrying 30 per cent. copper have been found.

The gold output of Southern Rhodesia for October was 53,822 ounces. There were 1,107 stamps working and 132,078 tons were crushed.

A considerable amount of activity is being displayed by prospectors among the western reaches of the Orange River, towards Upington, Kermoes. A number of farms have been taken up for diamonds and copper.

AUSTRALASIA.

The gold output of New Zealand for November was 54,121 ounces, value £215,524, as against 41,375 ounces, value £161,161,-983 for November 1906.

In the neighborhood of Barn Bluff, Tasmania, three immense ore bodies from 200 to 600 feet wide have been found. A low estimate of one of them gave 3,700,000 tons of payable ore containing copper, gold and silver. In another the ore assayed up to 20 per cent copper, 17 ounces silver and 4 dwts. gold. There is abundance of water power and timber in the neighborhood.

The Australian gold output for the 11 months ending with November, amounted to 2,883,935 ounces being a decrease of 284,243 ounces as compared with the corresponding period of 1906.

A syndicate with a capital of £35,000 has been formed to work a large area on the sea beach near Byron Bay, New South Wales, by dredging for gold and other minerals. The black sands will be treated with the Grill patent gold-saving machine, which is stated to have been successfully tested in Victoria.

At the London mine, Parkes, N. W. S., 90 per cent. of the gold is being recovered by the direct cyanide process.

CONGO FREE STATE.

Prospecting has revealed the existence of copper deposits throughout a zone extending 200 miles east and west and 50 miles north and south in Katanga district. A limited amount of development has revealed some two million tons of copper ore. Most of the deposits can be exploited by open cuts. The ore averages 13 per cent, metallic copper. Deposits of tin ore extend along the Lualaba River, below the Nsilo Falls for 175 miles, and explorations indicate the possibility of extracting a considerable quantity. The main drawback is the lack of transportation facilities.

STATISTICS AND RETURNS.

Sydney Mines, N.S.—A review of the operations of the Nova Scotia Steel & Coal Company, Limited, for the year just closed, shows a considerable increase in the volume of iron and steel produced and finished at the company's furnaces and mills. While the quantity of coal and ore mined was slightly less than that of the previous year, in accordance with the programme arranged early in the year, the output in all other branches shows considerable gains over any former year in the history of the company. The value of the aggregate output is also considerably higher.

Coal mined and shipped exceeded	680,000 tons
Coke made	90,000 tons
Iron ore mined	355,000 tons
Limestone and dolomite quarried	63,000 tons
Pig iron made	58,500 tons
Steel ingots	70,000 tons
Steel billets rolled at cogging mill, New Glasgow	55,000 tons
Steel bars, sheets and forgings manufactured from New Glasgow	53,600 tons
Freight paid to the Intercolonial Railway, direct	264,500
Freight carried on the Sydney Mines Railway of the company	1,300,000 tons
Freight carried by steamers owned and chartered by the company	650,000 tons
Wages paid at Sydney Mines	$1,385,000
Wages paid at New Glasgow	504,000
Wages paid elsewhere	270,000

The figures given above show, in most departments, very important increase over the previous year. In pig iron, about 18 per cent.; in steel ingots, about 35 per cent.; in plats, bars, and forgings, about 25 per cent.; coke, limestone and other products show increases of 10 per cent. to 12 per cent.

The plant and entire equipment of the company is to-day in a better position to handle an increased volume of business than at any time in the past.

1907 was marked in its early days by rapid recovery from the temporary depression caused in the previous autum by the rupture of relations between the Steel Company and its near relative the Dominion Coal Company. An unusually boisterous winter retarded progres ssomewhat, but from March to December operations were vigorously pushed and a full force was kept constantly employed. The results will be best understood by studying the table

of production—the tonnage of raw materials converted into iron and steel.

	Ore in tons.
Iron ore mined	593,000
Limestone quarried	352,600
Coke produced	409,000
Pig iron produced	256,500
Steel ingots produced	270,600
Blooms produced	237,500
Billets produced	71,000
Rails produced	129,000
Rods produced	64,500
Sulphate ammonia	1,550
Tar	*4,378,000
Granulated slag	17,000

* Gallons.

The most important additions to the company's plant were two Bessemer conveyors, with their accessory appliances.

The growing demand for power necessitated an increase in the quantity and efficiency of steam supply. This was obtained by the installation of several Babcock & Wilcox water tube boilers, and a system of superheaters.

The Nova Scotia Steel & Coal Company's coal output for 1907 will be approximately 650,000 tons, from three collieries, the new pit opened at Point Aconi, which was opened in June, adding only about 1,000 tons to the company's output for the year. A spur of railway 2 1-2 miles in length connecting this mine with the company's main line, was completed about a month ago. The work of pumping out No. 2 (Lloyd's Cove) Colliery begun on November 17th, is making excellent progress, and the water is being lowered at the rate of 30 to 40 feet per day. This colliery will be ready to produce probably in March next. It was abandoned in November, 1904.

In September last an electrically operated endless haulage system was installed in No. 5 Colliery. The new system is the latest and most approved in use, and is the only one of its kind in Cape Breton. No. 3 Colliery, which is the company's largest producer, was on single shift during the year, and to this fact is due the comparatively slight difference in the company's total output as compared with 1906.

The steel plant made an excellent showing in 1907 as compared with 1906, every department showing a large increase. The output of pig iron reached 59,000 tons, an increase of 10,000 tons over last year. The steel production was about 71,000 tons, being 20,000 tons more than was made last year. The coke output was also largely in excess of last year's record.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending January 3rd was 18,048 tons, a daily average of 3,609 tons.

The December output at the Nova Scotia Company's collieries totalled nearly 50,000 tons. The total amount of coal mined from the collieries during the twelve months just ended, was 638.065 tons, No. 3 Colliery being the biggest producer with an output of 296,466 tons; No. 1, with 256,161; No. 5, 82,310 tons, and No. 4. 3,128 tons.

A new blast furnace record was made at the works of the Dominion Iron & Steel Company on Thursday, 1,027 tons being the output for theday. This is about 25 tons better than the record announced a few days ago.

Cobalt ore statement for the week, December 28th, 1907 to January 4th, 1908:—

La Rose Mines, to New York, Jan. 1st, 1908, 48,190; La Rose Mines, to New York, Jan. 3rd, 1908, 56,720; total 105,910.

Townsite Mine, to Canadian Copper Company, Copper Cliff, Jan. 3rd, 1908, 45,100; Nipissing Mines, to New York, Jan. 4th, 1908, 54,410; total 204,420.

Cobalt ore statement for the week December 21st to 28th, 1907:—

King Edward Mine, to Willard P. Ward, New York, Dec. 23rd, 62,250; Trethewey Mine, to American Smelting & Refining Company, Perth Amboy, N.J., 62,000; total 124, 250.

NOVA SCOTIA RETURNS.

Estimated returns of mineral production for 1907:—

Coal	$13,876,000
Coke	1,925,000
Gold	265,000
Gypsum, limestone and other minerls	975,000
Stone and building materials	310,000
Pig iron	1,385,000
Steel	4,100,000
Steel rails, rods, etc.,	8,150,000

Coal.—An authority upon Nova Scotia coal mining, the Hon. Robert Drummond, predicts an increase of half a million tons in the production of 1908 over 1907. The slight decrease of the total tonnage for 1907 as compared with the previous year is attributable to scarcity of unskilled labor, to the tardy opening of the shipping season and to the strike at Springhill.

The estimated coal production by countries, is as follows:—

	1906 Tons.	1907 Tons.	
C. B. county	3,841,000	3,820,000	D.21,000
Piction county	593,000	642,000	I. 49,000
Cumberland county	509,000	420,000	D.89,000
Inverness county	227,000	280,000	I. 53,000
Total	5,170,000	5,162,000	D. 8,000

Gold.—Close estimates of the production of gold for Nova Scotia for the calendar year just closed, put the figure at 13,500 ounces produced from 62,000 tons of quartz. This represents an average of $4.14 for every ton crushed. To this total 24 mines contributed. Many of these mines, however, were not in continuous operation. The output is valued at $265,000.

MARKET NOTES.

Silver.—December 19th, 53; December 20th, 53; December 21st, 52 1-2; December 23rd, 52 3-4; December 24th, 52 3-4; December 26th, 52 3-4; December 27th, 52 1-2; December 28th, 52 1-2; December 30th, 52 3-4; December 31st, 53 1-2.

December 31st, sterling exchange, 4.825.

Copper.—The copper market is steadying, with a strong trend towards higher prices.

December 31st, New York.—Lake, 13 7-8 cents per lb.; electrolytic, 13 5-8; London, standard, £62 for spot.

Lead.—Prices moving up from low water mark. New York, 3.55 cents per lb.; London, £14 for spanish.

Tin.—Light transactions on firm market. New York. 27 1-4; London, £123 11s. for spot.

Quicksilver.—New York, $46 per 75 lb. flask.

Industrial Paragraphs.

Circular No. 1,097 of the Canadian Westinghouse Company, describes their types K and KG motors. These direct-current series wound motors are for use on cranes, hoisting machinery and similar service.

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situated at St. Catharines, Ont., 11 miles from Niagara Falls, on the line of the Grand Trunk Railway System, is a happy combination of family hotel and sanitarium. The Welland is designed for a resting place and possesses all the essentials at moderate cost. Mineral Salt Water Baths of various kinds, Massage, Electricity and Special Tonic treatments for overworked minds and bodies. Write to the Manager, The Welland Inn, St. Catharines, Ont., for illustrated descriptive matter, and apply to Grand Trunk Agents for particulars regarding routes and rates.

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Passenger Traffic Manager
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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

HON. MINISTER OF MINES

Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

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NEW EXPRESS STEAMERS—QUEBEC TO LIVERPOOL



EMPRESS OF IRELAND—EMPRESS OF BRITAIN

570 feet long **65½ feet broad** **14,500 tons**

RATES

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3rd " - - - -	28.75

SECOND CLASS

The 2nd class rooms on these steamships afford very superior accommodation. They are very large and airy, and are splendidly furnished.

THIRD CLASS ACCOMMODATION

In addition to the up-to-date Music Room and Smoking Room for the accommodation of 3rd class passengers, there is provided, as well as the usual open promenades, a large and airy enclosed promenade the full width of the ship, a great benefit to passengers during wet weather. In the centre of this promenade is an enclosure used as a playground for the children, where they will be happy, safe and comfortable, thus affording tired mothers an opportunity to rest.

Special stewards are appointed to attend to passengers in this class. Meals are served on permanent tables with white table cloths, and the cups and plates and eating utensils are washed and kept clean by the stewards in charge of them.

Each steamer carries an experienced surgeon, and a stewardess to attend to the women and children.

The provisions supplied are of the very best quality. They are examined when put on board by His Majesty's Emigration Officers.

Tickets and all information from any railway or steamship agent

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Established 1867

B. E. WALKER, President. ALEX. LAIRD, Gen. Mgr
A. H. IRELAND, Superintendent of Branches.

Paid-up Capital, -	**$ 10,000,000**
Rest, - - -	**5,000,000**
Total Assets, - -	**113,000,000**

Branches throughout Canada and in the United States and England, including the following:

Cobalt	Nelson	Seattle
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Dawson	Ottawa	Springhill
Fernie	Parry Sound	Sydney
Greenwood	Penticton	Toronto
Halifax	Port Arthur	Vancouver
Ladysmith	Portland, Ore.	Victoria
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Branches at COBALT and LATCHFORD, in the silver mining camp of New Ontario.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and Europe is invited to the

Mineral Territory

Open for Investment in the Province of Quebec

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc. **Ornamental and Structural Materials in abundant variety.** The Mining Law gives absolute security to title and has been specially framed for the encouragement of mining

All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions. The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assay can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries,
Parliament Buildings, Quebec.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

Before purchasing supplies, machinery or equipment, consult the firms mentioned in this Directory. They are prepared to fill your order with all possible despatch. If requiring anything not listed in these columns, address THE CANADIAN MINING JOURNAL and you will be put in touch with responsible firms. In writing advertisers, kindly mention this Journal

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

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Write your order plainly and fully. Address your envelope plainly and fully, enclose the money and mail it to us. That is all you have to do.

When your letter comes your parcel is made up, checked and shipped with as little delay as is necessary for accuracy, in a department where thousands of such parcels are handled every day.

Our Fall and Winter Catalogue is ready for mailing on the first of September. Send us your name and address and we will gladly mail you one and put you on the list for all subsequent catalogues. Our new Catalogue for 1908 is a complete price list of nearly every article of merchandise to be found in the store. A veritable hand-book of information for housekeepers and a thing of interest for everybody who has buying to do and money to spend. Write for it now so as we can have your name on the list in time for the first mailing.

Here are "Specials" for mining men, prospectors, and all readers of this paper who have heavy work to do or rough journeys to make.

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to readers of this paper

1100 strong, serviceable English, Canadian and Scotch tweed suits, also English corduroy, suitable for business or town wear as well as for men who need strong clothes. Weights are medium and heavy. Regular prices run from $10.00 to $14.00. Sizes 35 to 44. We offer these suits to readers of this paper for **$7.95**

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500 Working Jackets, of striped moleskin and duck in khaki, brown and slate. Regularly $2.00 apiece. Special to readers of this paper **$1.25**

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500 Men's Heavy Khaki Duck Mining Shirts, collars, pockets, have patent fasteners, large roomy shirts, wind and rain proof. Sizes, 14 to 17½. Special ..... **.89**

Men's English Cardigan Jackets and Golf Coats, three pockets, guaranteed all worsted, fast color. Sizes, small, medium and large. Regular value $4.00 and $5.00. Each **$2.98**

Men's Heavy Elastic Web Suspenders, strongly sewn, made with unbreakable cast off leather ends, Police-Firemen style. Our price 50c. Each ..... **.39**

Men's Heavy Tweed Shirts with collar and pocket, generously made, double stitched throughout, also a few heavy Mackinaws and black Drills in the lot. Sizes 14 to 18. Regular value, $1.25, $1.50, $1.75, $2.00. Each .. **.89**

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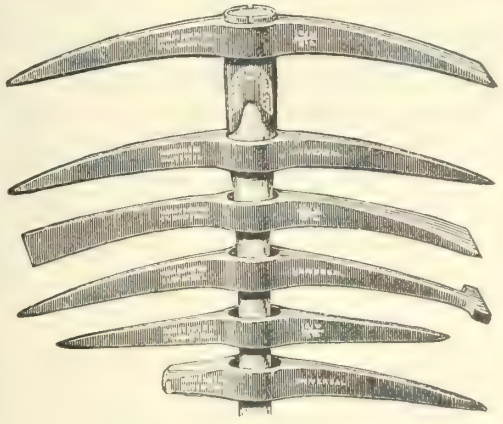
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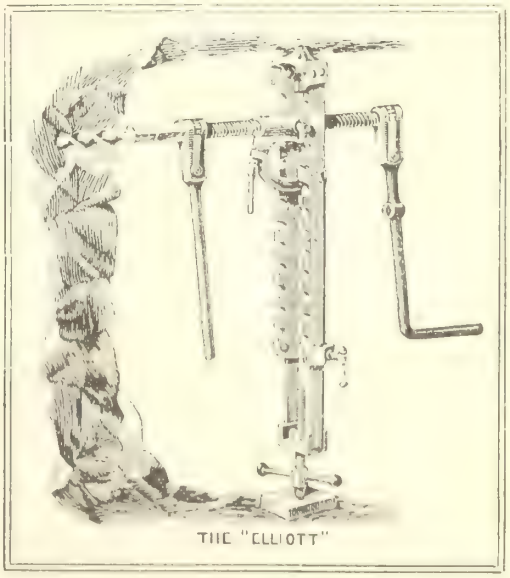
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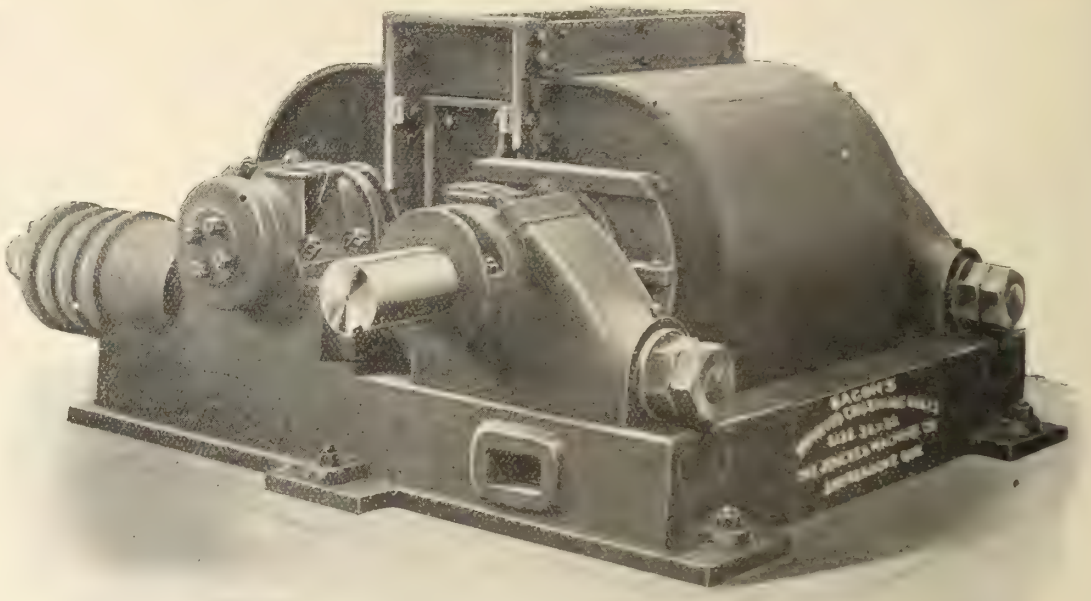
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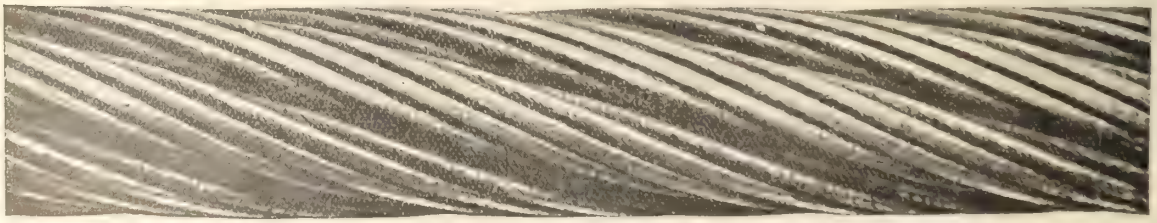
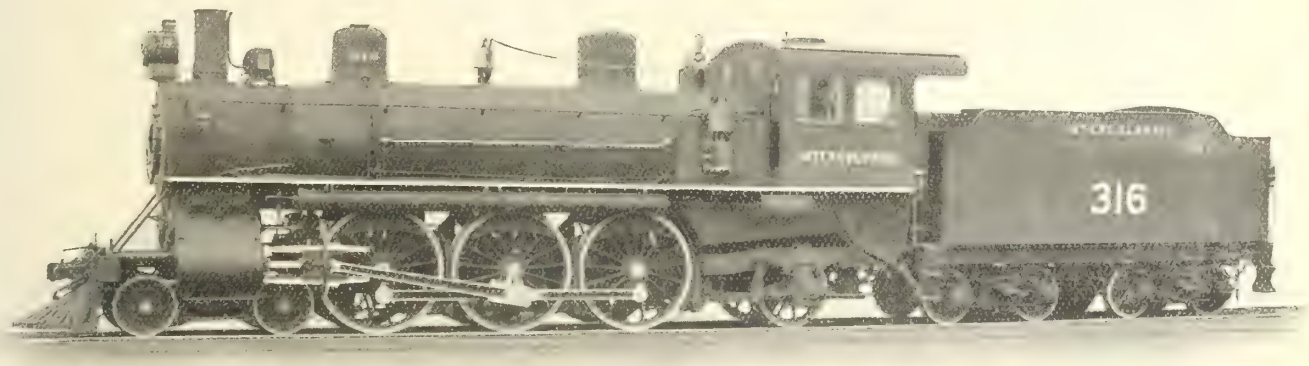


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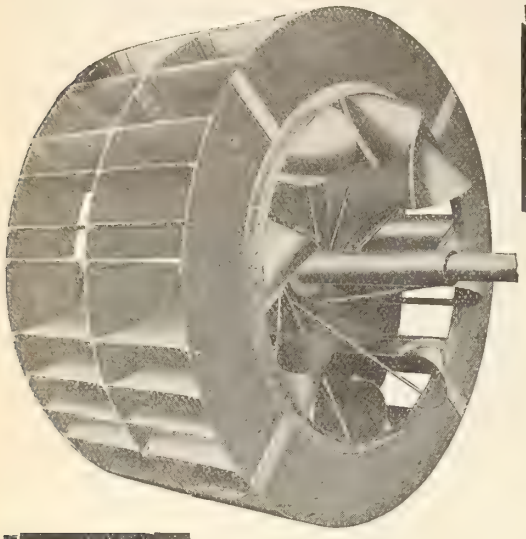
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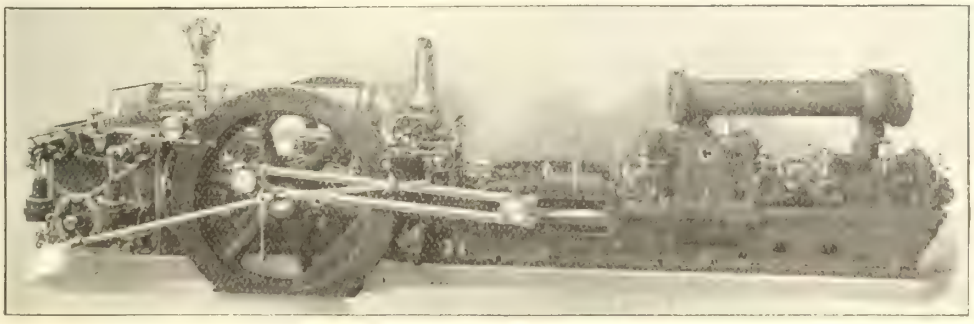
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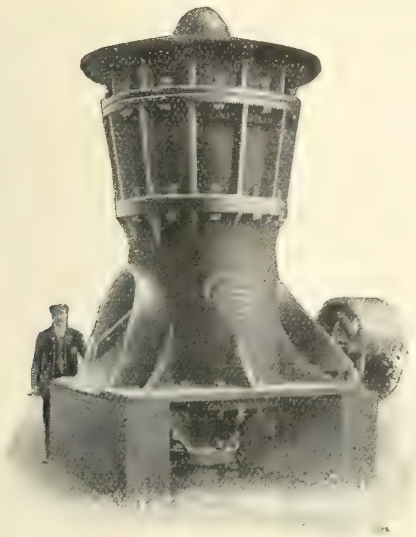
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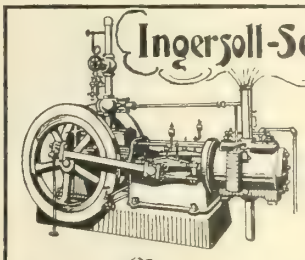
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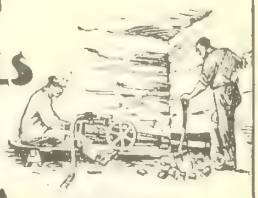
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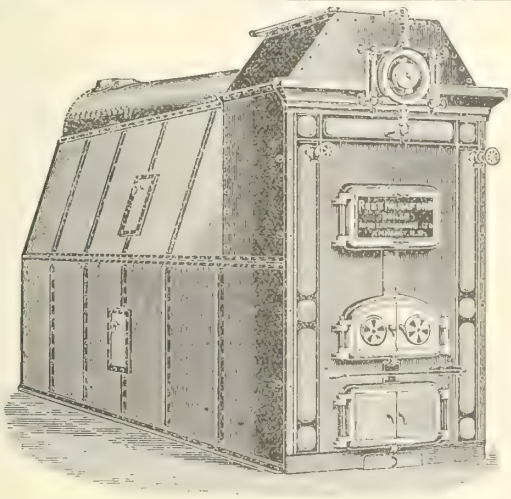
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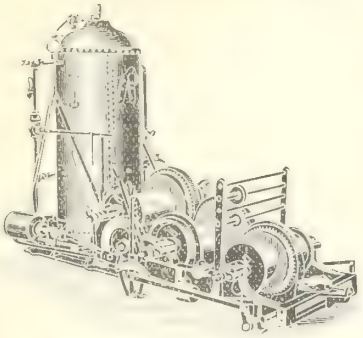
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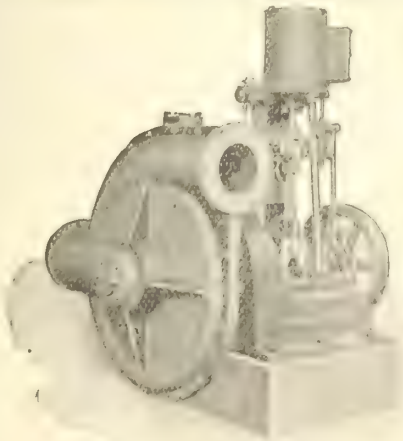
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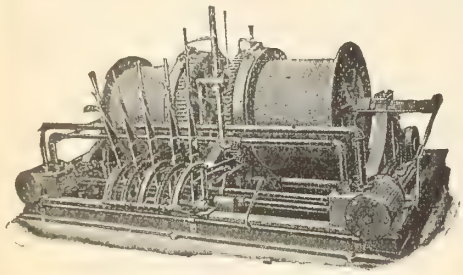
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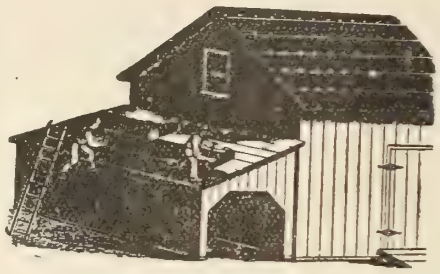
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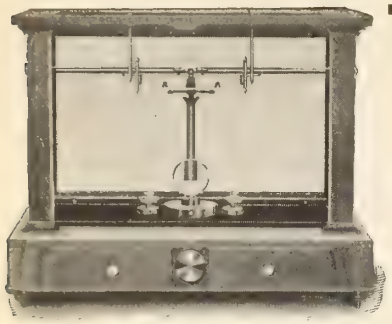
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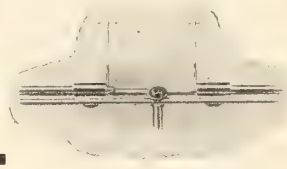
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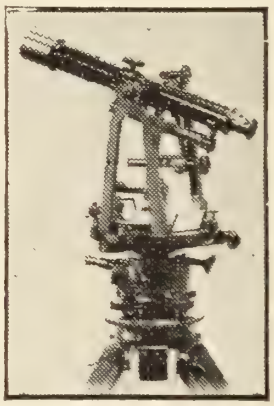


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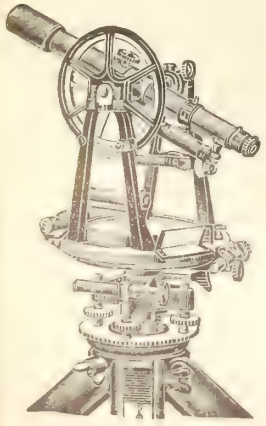
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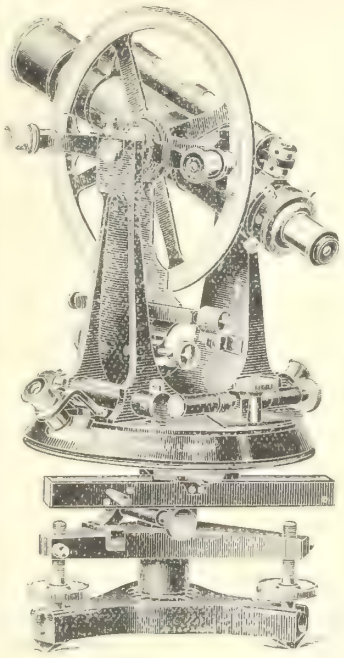
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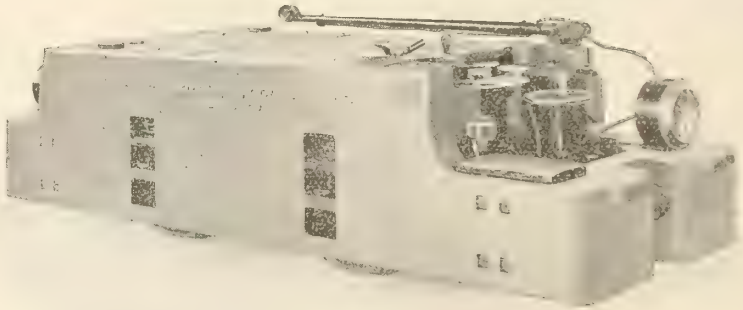
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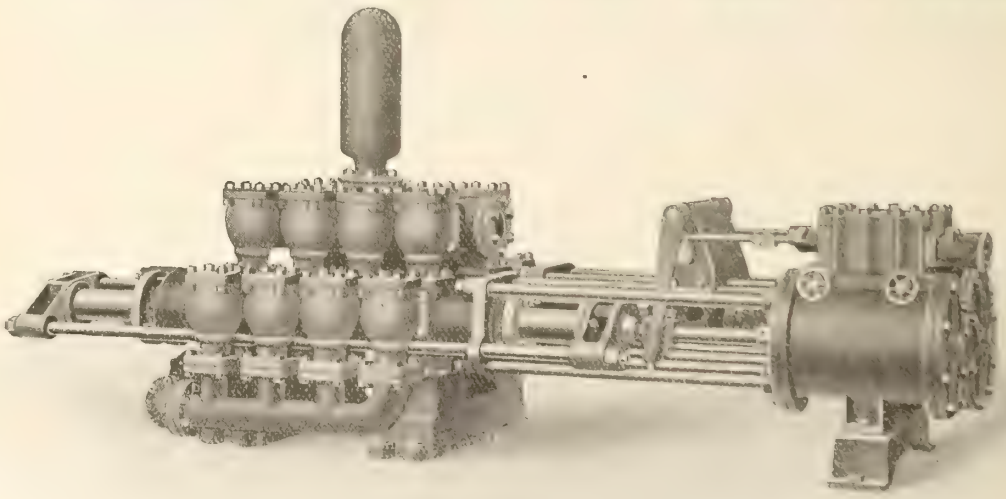
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THE CANADIAN MINING JOURNAL

THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

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ASSISTANCE TO PROSPECTORS.

Mr. J. B. Tyrrell, whose thoughtful articles we are always glad to publish, has recently made a practical and helpful suggestion. The railway companies every year grant special rates to sportsmen. Hundreds of townspeople, mostly the well-to-do, leave town during the fishing and hunting seasons. To these folk the railways offer special inducements. Reduced rates are given. Attractive folders, containing information regarding lake and river fishing, or describing the haunts of moose and deer, are widely distributed.

This policy is profitable to the railways and to those in search of recreation. But of infinitely greater profit to the country at large would it be were the railways to use similar means to encourage prospectors to explore the virgin fields of all our Provinces.

If specific geological and topographical data could be obtained from the railway offices, and if the inducements of cheap rates and special trains were held out, there is no doubt that many persons, now unable to afford the outlay, would spend their holidays not in the wanton destruction of animal life, but in searching for valuable minerals—an employment that cultivates mind and body alike.

A movement of this kind will meet with the warmest approval and co-operation of all mining men. The Canadian Mining Institute will be able and willing to contribute effective assistance.

This appears to us to be one practical method of encouraging the prospector. There are, no doubt, other means just as good. Therefore we shall be glad to receive letters from any of our readers who have given the subject thought.

EXPANDING MARKETS.

THE CANADIAN MINING JOURNAL is constantly receiving enquiries for ores of rare metals. Amongst the most urgent enquiries have been several from the United States for molybednum ores. An editorial note to this effect in a recent issue elicited many answers. A few of these answers were interesting. Most of them, however, were vague and meaningless. A large proportion of the properties referred to were totally undeveloped and of unknown value. Moreover, their owners were unwilling to spend money in ascertaining their extent and character, and were holding them with a view to effecting their sale at figures unreasonably large.

Instead of securing the opinion of a mining engineer who could advise concerning development and who could evaluate the property when developed, the owners prefer

to allow their claims to lie idle. This, however, by the way.

What we wish to indicate is that almost daily we receive enquiries for ores of tungsten, molybdenum, manganese, antimony, etc., etc. For the first two there is a very marked demand.

We shall, therefore, be glad to hear from owners of mineral properties who are either prepared to ship ore, or have prospected their areas sufficiently to know what they have.

SUMMARY REPORT OF THE GEOLOGICAL SURVEY—1907.

The despatch with which the Geological Survey of Canada has issued the summary of its labors during 1907 is creditable to all concerned. Its early appearance has set a pace that should be followed by Provincial Departments.

Unlike its predecessors, the summary for 1907 is a short, succinct resume. Formerly the annual summary reproduced a full account of the field work and investigations of the staff. The 1907 summary is a departure. It is an actual summary. It presents a concise outline of operations in the field and in the laboratory. Heretofore the summary has, in a sense, duplicated the various individual reports that were to appear later. Hence it was valuable to the general public, especially if the separate reports happened to be delayed, as was often the case.

Now, however, the case is different. The publication of a summary within a fortnight of the close of the old year, makes it incumbent upon the Survey to complete and issue the reports of its geologists and specialists at a very early date. Otherwise the public will be kept waiting for information that is of utmost importance.

In short, the Survey has set a pace not only for the Provinces, but for itself. This excellent summary will be meaningless unless the reports of each of last summer's geological parties is promptly forthcoming.

Meanwhile we congratulate the Minister of Mines on this new indication of efficiency.

A WESTERN BRANCH OF THE C.M.I.

On another page are given full particulars of the organization of a Western Branch of the Canadian Mining Institute at Nelson.

In the selection of its officers this offshoot of the present Institute has been particularly fortunate. Mr. A. B. W. Hodges is president, and Mr. E. Jacobs is secretary. Mr. Hodges is one of the outstanding figures in the mining circles of British Columbia. Mr. Jacobs, the able and fearless editor of the British Columbia *Mining Record*, is probably the best unofficial authority on Western mining affairs. Under his management the *Record* has proved itself a clean, reliable journal. Mr. Jacobs will undoubtedly perform the duties of his office with enthusiasm and discretion.

The remoteness of British Columbia mining centres from the East has made it impossible for many of the members residing in that Province to attend the annual meetings of the Institute. For this reason the Western Branch has been organized. Western members will now be able to meet for discussion of matters of moment whenever necessary. They will be enabled to deal promptly and weightedly with local issues and, at the same time, their support and advice will be of greater value to the parent institution.

LEAD BOUNTIES.

A petition, signed by practically all the owners and managers of silver-lead mines in East and West Kootenay, is about to be presented to the Dominion Government. The petitioners ask for an extension of the lead bounties.

Originally the Government appropriated $2,500,000 for the purpose of assisting the lead industry. This sum was to have been paid out in five annual payments of $500,000. The bounty period of five years expires in June of this year. So far, owing to restrictive conditions attached to bounty payments, only $600,000 has been paid out.

It is claimed with justice that the Dominion Government, having given a moribund industry a new lease of life, cannot now withdraw its aid. Additional force is lent to this argument by the consideration that only a fraction of the original appropriation has been expended. The lead producers are therefore approaching the Government with entire confidence that their reasonable request for an extension of the lead bounty will not be refused.

INSPIRED "NEWS."

An item has been going the rounds of the press and has unfortunately been reproduced in one or two technical journals, to the effect that a "corps of government engineers" employed by the "Dominion Government" had undertaken to solve the question of the depth and persistence of the silver deposits of the Cobalt districts. The item is untrue. Whatever basis some of the statements may have in fact is not a matter of public information. But the paragraph in question was written by an irresponsible person, who was either designedly misinformed or was himself untruthful. The question of the depth of Cobalt veins is working itself out every day. There is, however, no short cut to knowledge of this sort.

Neither the Ontario Government nor the Dominion Government has done any diamond drilling on the Gillies limit.

The Annual Meeting of the Geological Society of America, at Albuquerque, New Mexico.

Cyril W. Knight.

The Geological Society of America held its twentieth annual meeting in Albuquerque, the chief city of New Mexico, on December 30th and 31st, 1907. An informal session of the council was held in the Alvarado Hotel late in the evening of December 29th, on the arrival of the train from Chicago. The following two days were devoted to business and to the reading of papers, President Charles R. Van Hise being in the chair. A list of the papers is given below. The sessions were held in Hadley Science Hall, University of New Mexico, the president of which, William G. Tight, was untiring in his efforts to keep things running smoothly.

North America), mention is here made of the paper on the subject by President Charles R. Van Hise. He gave a splendid review of pre-Cambrian geology. In the spirited discussion that followed it was brought out that all agreed in the fundamental principles of classification, and that it was merely in the nomenclature that the dissenters found fault.

It was the expressed opinion of the society that the meeting was one of the most successful and instructive in its history.

During these two days most of us found time to visit what is known as the "old town" of Albuquerque, which



Members of the Geological Society of America, in the Sandia Mountains, near Albuquerque, New Mexico, between seven thousand five hundred and eight thousand feet above the sea.

The annual dinner of the society was held the evening of the 30th. It was over before ten o'clock, and was a source of keen enjoyment in its delightful informality, no toast list having been prepared. The following evening a reception and dance was given at the Commercial Club of Albuquerque and some of us had the pleasure of meeting and dancing with the most charming type of Southern girlhood.

There were fifty-one papers presented or read by title. No attempt will be made, therefore, to give synopses or go into the discussions. But in so much as Canadians are particularly interested in pre-Cambrian geology (Canada having the largest areas of these rocks in

has as yet escaped the dominating influences of American civilization. Here the easy-going, sun-loving Mexican lives in his adobe. The latter is built of sun baked clay bricks, to which some straw has been added. One building near the Roman Catholic Church was said to be two hundred and fifty years old. The church itself was one of those cool, dimly lighted buildings which must be extremely suggestive, to anyone with a spark of imagination or romanticism, of old time Mexican life. The few windows were high up and small and a soft, diffused, golden yellow light filtered through. It was cool, almost cold, compared to the warm clear air outside. As for the "soft voiced senoritas," to whom the railway



THE GRAND CANYON OF ARIZONA.

guide-book had referred with sublime and picturesque good faith, they failed utterly to materialize.

In one respect New Year's Eve was historical in Albuquerque. Gambling up to that night was not unlawful. We visited some of the gambling halls and saw the roulette wheel and other games in full swing. The places were crowded. But 12 o'clock New Year's Eve all these "joints" were compelled by law to close for the first time in hundreds of years.

New Year's Day was devoted wholly to a trip into the Sandia mountains (near Albuquerque), which rise over 10,000 feet above sea level. The excursion was made under the auspices of the Commercial Club of Albuquerque and the University of New Mexico. Four vans, each drawn by two teams of horses, left the city at seven in the morning. It was quite cold at that hour. After the first mile there is a gentle, gradual rise for ten miles until the foot of the mountains is reached. To one not used to desert country it was puzzling to note that on this gentle ascent the road seemed to be falling towards the mountain, but that always when we looked backwards it also fell away. It was merely one of those deceptive phenomena of the desert and mountain country. The ascent was continued until about one o'clock, through deep canyons and along winding aroyas, when an elevation of between seven thousand five hundred and eight thousand feet above sea level was reached. Here the party had lunch. Within a stone's throw the basal conglomerate of the Carboniferous was splendidly exposed, lying unconformably on quartzite and quartz schist of possibly pre-Cambrian age. The relationships of the pre-Cambrian rocks of the Sandia mountains have not been fully or satisfactorily worked out. We were keenly interested to find among them an old looking greenstone resembling the Keewatin series of Northern Ontario and the Lake Superior regions. This was intruded by granite. Besides the quartzite above mentioned there is a metamorphosed granite gneiss the relationship of which to the other three members was not clear.

After the sun was well up, even at this high altitude, it was warm and balmy. For the Eastern visitor the air was indescribably exhilarating. Here and there in the canyons we passed the adobe, and occasionally in the more open parts we met the solitary sheep-herder, with his herd all bunched together.

The return trip was made by a different route, giving us a chance to drink some natural carbonated mineral waters, and to see again the basal conglomerate of the Carboniferous, this time lying unconformably on the broken down surface of the metamorphosed granite gneiss above mentioned. We reached Albuquerque a little after dusk and the same evening took our sleeper for the West.

Before dawn the following morning (January 2nd) Adamana was reached. Our Pullman remained here for a day to allow a visit to the celebrated Petrified forest of Arizona. Most of the party got well loaded up with specimens of the fossil trees, the colors of which are very beautiful and the original structures well preserved.

We left in the evening for the Grand Canyon of Arizona, which was reached the following morning. For many of us this was the real point of interest on the trip. It would be puerile and uninteresting for a tyro to attempt a description of the canyon. All of us have read about it and will recall its total length of 217 miles. Its width for the fourteen miles we saw is 13 to 15 miles, and depth over a mile. The elevation of the rim is about 7,000 feet above the sea. To the reader these figures probably mean nothing, nor do they to the onlooker. It is only when one has gone down, down, down on the trail to the bottom of the gorge that he realizes to some extent its depth. For the lower 1,000 feet the Colorado river has cut its way through granites and gneisses for all the world like our vast Laurentian areas in Canada. As seen from Grand View Point the series appears to have been eroded down to a plane. What is known as the Grand Canyon group of sedimentary rocks rests unconformably on this floor. On the gently upturned edges of the canyon group rest, unconformably, Paleozoic beds, the majority of which are more or less horizontal. The Carboniferous is the surface rock. For those of us who had worked on pre-Cambrian geology in the thickly wooded, monotonous peneplane of Northern Ontario, where unconformities and relationships are with difficulty unravelled beneath their ubiquituous, glacial mantle, it was a source of delight to be able to see from the rim of the canyon such a profound succession of rocks.

But apart from geological considerations was the external beauty and grandeur of the chasm. Some of us were at the brink before daylight to watch the sunrise effects. No one will probably ever catch the coloring on canvas. One evening three of us had been quietly ab-



Mexican adobe in the "old town" of Albuquerque, New Mexico, showing in the left foreground. Dr. Ami, of the Canadian Geological Survey, on the right.

sorbing the scenery in front of the hotel, when four Western gentlemen issued from the door and walked to the side of the canyon. We had already experienced the different effects which a first glance produced, but it was rather startling to be brought back to earth by this expression: "By God, that's the deepest hole I ever see!" It was uttered with a nasal drawl and his earnestness was not lessened by the fact that he had dined not wisely but too well.

Some of the party made the trip down the Bright Angel trail on mules, while others, perhaps more energetic, preferred to walk. The distance to the bottom and back is about thirteen miles. A few of those who rode were novices on either horses or mules, and for them there were moments when thrilling was a tame word to apply.

Saturday evening, January 4th, the party broke up, the majority going home, but a few remained longer at the canyon before taking the train East.

The writer is not a member of the Geological Society of America, but it is with the permission of the secretary, Dr. Hovey, that this article is written.



Having lunch at the bottom of the Grand Canyon of Arizona, showing Colorado River.

LIST OF PAPERS.

President's address.

Economic.

1. A. C. Lane—Field Assay of Mine Waters. (15 minutes.

2. Frank R. Van Horn—The Occurrence of Proustite and Argentite at the California Mine near Montezuma, Colorado. (5 minutes.)

3. E. H. Sellards—The Phosphate Deposits of Florida with Relation to the Underground Water Level.

4. Joseph Hyde Pratt—Asbestos Depósits of the Grand Canyon, Arizona.

Physical and Structural.

5. Charles R. Keyes—Ancient Tectonics of the Basin Ranges. (10 minutes.)

6. Charles R. Keyes—Rock-Floor of Intermont Plains of Arid Regions. (15 minutes.)

7. George D. Louderback—The Chief Features of the Stratigraphy and Structure of Mt. Diablo, California. (30 minues.)

8. William Herbert Hobbs—The Earthquake in the Owens Valley, California, in 1872. (By title.)

Glacial.

9. A. P. Coleman—Glacial Periods and their Bearing on Geological Theories. (20 minutes.)

10. Frederick W. Sardeson—Beginning and Recession of Saint Anthony Falls. (By title.)

11. Bohumil Shimek—The Nebraska "Loess Man."

12. Frank B. Taylor—The Distribution of Drumlins and its Bearing on their Origin. (By title.)

Stratagraphic.

13. B. K. Emerson—The Cirques and Rock-Cut Terraces of Mt. Tobey, Mass.

14. H. P. Cushing—The Lower Portion of the Paleozoic Section in Northwestern New York. (25 minutes.)

15. W. H. Sherzer and A. W. Grabau—A New Fauna from Michigan. (30 minutes.)

16. C. W. Hall—The Red Sandstone Formation of Southeastern Minnesota. (10 minutes.

17. Frederick W. Sardeson—The Geologic History of the Redstone Quartzite. (By title.)

18. N. H. Darton—Geology of a Portion of Central Wyoming. (15 minutes.)

19. N. H. Darton—Some Features of Geology in Arizona and Western New Mexico along the line of the Santa Fe Railroad. (10 minutes.)

20. W. G. Tight—Relation of the Equus Beds of Kansas to Reversed Mississippi Drainage.

21. Willet G. Miller and Cyril W. Knight—Grenville-Hastings Unconformity. (25 minutes.)

22. A. C. Lane, C.S. Prosser, W. H. Sherzer, and A. W. Grabau—Nomenclature and Subdivisions of the Upper Silurie Strata of Michigan, Ohio, and Western New York. (20 minutes.)

23. A. H. Purdue—Structure and Stratigraphy of the Ouachita Ordovician Area, Arkansas. (20 minutes.)



Descending Bright Angel Trail at the Grand Canyon of Arizona. Dr. W. G. Miller, Ontario Provincial Geologist, and Mr. L. H. Kerr, of Toronto, in background.

24. John E. Wolff—Notes on the Crazy Mountains, Montana. (25 minutes.)

25. George Rogers Mansfield (Introduced by J. E. Wolff)—Glaciation in the Crazy Mountains of Montana.

26. T. A. Jaggar, Jr.—The Shaler Mountains, Unalaska, a Granite Core to the Aleutian Islands. (15 minutes.

27. T. A. Jaggar, Jr.—The Growth and Destruction of Metcalf Cone, Bogoslof Islands, 1906-7. (15 minutes.)

28. W. G. Tight—The Sandia Mountains.

29. A. H. Brooks—The Geology of the Alaska Range.

30. J. S. Diller—Strata Containing the Jurassic Flora of Oregon. (15 minutes.)

31. A. H. Brooks and E. M. Kindle—The Paleozoic and Associated Rocks of the Upper Yukon Basin. (By title.)

PALEONTOLOGIC.

32. N. H. Darton—Discovery of Fish Remains in the Ordovician of the Blask Hills. (5 minutes.)

PETROGRAPHIC.

33. Horace B. Patton—The Topaz-bearing Rhyolite of the Thomas Mountains, Utah. (30 minutes.)

34. J. S. Diller—Local Silicification of the Knoxville. (5 minutes.)

35. B. K. Emerson—The Association of Pegmatite with Hornblendic Border Beds of Granite and the Appearance of Large Isolated Masses of the Two Together Deep in the Granite. (10 minutes.

36. George D. Louderback and W. C. Blasdale—Benitoite, its Mineralogy, Paragenesis and Geological Occurrence. (20 minutes.)

37. Ida H. Ogilvie—The Igneous Rocks of the Ortez Mountains.

PHYSIOGRAPHIC.

38. Amadeus W. Grabau—The Preglacial Drainage in Central-Western New York. 25 minutes.)

39. Charles R. Keyes—Geographic Cycle in an Arid Climate. (10 minutes.)

40. Alfred W. G. Wilson—Shoreline Studies on Lakes Ontario and Erie. (20 minutes.)

41. Douglas Wilson Johnson—The Faults and Folds of the Grand Canyon District. (By title.)

42. E. H. Sellars—The "Prairies" of Florida: A Stage in Topographic Development.

CANADIAN MINING INSTITUTE—TWO IMPORTANT NOMINATIONS.

The ballots soon to be issued to the members of the Canadian Mining Institute will include two names to which THE CANADIAN MINING JOURNAL wishes to draw especial attention. Mr. H. E. T. Haultain has been nominated for the position of Secretary, and Mr. Milton L. Hersey for the position of Treasurer.

The Institute is fortunate in having names such as these on its nomination list. Both of the nominees are Canadians who have attained honorable prominence and success in their respective professions. Both are active members of the Canadian Mining Institute and of foreign scientific societies.

Mr. Haultain has been a true cosmopolite. His earlier education was received in Peterborough, Ont. Thence he entered the School of Practical Science, Toronto. After taking his degree from the University of Toronto, he took post-graduate mining work at Freiberg and London.

His early mining career began in Ireland and was continued in Bohemia, in which latter place he operated tin mines with success for a couple of years. His next move of importance brought him to Canada again, where in British Columbia he spent several years chiefly in the placer deposits of the Fraser River, controlling there the investment of considerable sums of money in pioneer work for the handling of auriferous sands by dredging and hydraulic methods.

From here about the year 1896 during the height of mining development in the Rand, South Africa, he was appointed from London, Eng., to take a prominent position in that mining field. Several years were spent here in various responsible positions at a number of the large mines, and he was finally retained by an English company, operating a gold property in Swaziland, where he designed and built a large stamp mill. About this time he unfortunately met with an accident which put an end to his career in South Africa, for the time being, and landed him in a London hospital for several months.

After this he returned to Canada where, with the exception of some time spent in the Western States, he has since remained engaged in a variety of mining under-



H. E. T. HAULTAIN.

takings. In British Columbia he developed and operated a number of gold mines, designing and erecting the entire plants. During the same period, and subsequently he acted as consulting engineer with the control of other important mines. While there he invented what is known

as the Haultain-Stovel Grease Process, for the separation of metals and sulphides from slimes. This latter occupied nearly two years of his time and on its perfection he was appointed to a special position by the corporation controlling many of the largest lead mines in the Western States, to investigate completely the efficiency of their milling plants.

Later he devoted his spare time to research work, especially in the mechanical and lixivation treatment of ores. He is admittedly one of the foremost authorities on this subject. One of his successes during this period was the invention of a new apparatus for electrolytic laboratory work, which has been adopted by a great many of the chemical laboratories attached to smelters and mining plants throughout the States.

In the summer of 1905 he was called from Arizona to take the position of manager of the Canada Corundum Company's mines at Craigmont, Renfrew County, Ontario, where he has brought to a successful issue what is probably the most difficult concentration problem that has yet had to be solved. In recognition of his work here he was, about a year ago, appointed general manager of all of the company's interests. His experience here for the past three years, controlling a force of from three to five hundred men under extremely difficult circumstances, has brought him prominently into touch with mining life and interests in Eastern Canada, a field where he was but little known before.

In the year 1900 he applied for and obtained with very high standing the degree of Civil Engineering, University of Toronto. Since then he has been elected to Asscoiate Membership in th Institute of Civil Engineering and Membership in the Institute of Mining and Metallurgy.

Mr. Haultain is a clear, forceful writer. His varied professional experience, his familiarity with mining methods in both the new and old world, and his deep acquaintance with technical literature, fit him peculiarly for the position to which he is nominated. As an executive officer and as editor of the publications of the Institute, his services will be of the highest rank.

The nominee for the position of Treasurer, Mr. Milton L. Hersey, of Montreal, is one of the foremost consulting chemists of the Continent.

Mr. Hersey, after graduating from McGill University, started in a modest way his present business of consulting chemist and assayer. A few years after obtaining his baccalaureate degree he applied for and obtained the degree of MSc.

For about twenty years Mr. Hersey has practised his profession in Montreal. To such an extent has his business grown that he now employs a staff of twelve or thirteen assistants in Montreal, most of whom are trained specialists.

Mr. Hersey's work has been of such immediate commercial importance that, recognizing the value of his expert advice, not only the City of Montreal and the Province of Quebec have officially retained his services; but many of the larger railway corporations and industrial concerns have engaged him either permanently or from year to year.



MILTON L. HERSEY.

The management of a large commercial laboratory, conducted on modern lines, has brought Mr. Hersey into contact with mining men from all parts of Canada and the United States. He is himself largely interested in the mining industry of Canada.

Mr. Hersey is young, vigorous and capable. As an official of the Canadian Mining Institute he will have the advantage of previous experience in other scientific societies.

THE CANADIAN MINING JOURNAL, as the official organ of the Canadian Mining Institute, and as the representative of the mining interests of Canada generally, endorses most heartily the two nominations mentioned above. We are confident that the election of both Mr. Haultain and Mr. Hersey will be for the good of the Canadian Mining Institute.

COPPER ORES OF THE SUDBURY-SOO DISTRICT.

J. C. GWILLIM.

Along the line of the C. P. R. westwards of Sudbury, and towards Sault Ste. Marie, there is a wide belt of Huronian rocks, the home of the Huronian rocks, if one may be safe in calling them by their time-honored name.

Throughout this belt of rocks westwards from Webbwood there is a type of copper-bearing vein, of which the Bruce Mines vein is a good example. At the Bruce Mines the vein is a nearly vertical quartz chalcopyrite vein in a fissure across a large area of diabase; in other places these veins are in fissures or along contacts of other rocks as well as diabase. They are usually nearly vertical, and they seldom carry much besides quartz, ankerite and chalcopyrite, and a little pyrites and specular iron sometimes in the more segregated or contact deposits. One is inclined to be surprised at the persistency with which these veins follow the general type over so large a district, and in such diverse rocks, diabase, quartzite, conglomerate and various highly metamorphosed ancient rocks.

The copper values, excepting superficially, are in the form of scattered chalcopyrite. The pay streak is not well defined or collected along either wall, or anywhere

else. Thus the rock is a milling rock, for the values in large tonnage rarely rise above 3 1-2 per cent. copper, with hardly a trace of gold or silver. Yet gold and silver veins do exist in their vicinity, as the Shakespeare mine near Webbwood and the Captive north of Bruce Mines and Rock lake testify, while silver is found with zinc and lead northwards from Garden River.

These bright quartz and yellow copper ores make very pretty displays in shop windows in various towns beside the great lakes, and have interested many people in their exploitation. Usually the mining rights belong to the farms who own the ground about these showings. Someone buys this right and the undeveloped prospect for a few hundred to five thousand dollars, shoots out a few sacks of ore and hires or uses a window for the display, calling for subscribers to put up money for development. In this way a few thousand dollars are raised, and work is begun.

The usual plan is to sink a vertical shaft at some point and do little prospecting or stripping elsewhere. The idea is to get down. After a time the funds run out, and since there is some trouble in realizing anything upon this class of ore, the work shuts down and the shaft fills with water.

Thus many hopeful prospects have now little to show but this timbered, water-filled shaft, and a dump which covers any adjacent surface showing. The natural inference is that if one pumped the water out one would only see the same thing as that which caused the development to cease, so that the ground is in a very unsatisfactory condition.

There is one strong point about these veins, they usually stay with one. There are few displacements or faults, and they have a considerable continuity both along the surface and in depth. Some of them, as Bruce Mines and Rock Lake, have produced quite heavily.

But Bruce Mines and Rock Lake, and every other producer, have met the same problem of a good saving by milling. The ores are not self-fluxing. They are far from it. They are low grade silicious copper ores, which look promising when copper is at a high price, especially to people who are wont to hear of the Michigan mines making money on ores of less than one per cent.; but these Georgian Bay ores are a totally different proposition, and they must be concentrated by some other method than by water to get a saving of over 60 per cent. or so. The copper pyrites floats as a yellow scum to a visible extent, and fine grinding is necessary to liberate the metallic particles.

Some experiments have been made with this ore by the vacuum oil process with exceedingly good results, both in the quartz-ankerite, copper-pyrites ore and the quartz copper pyrites ore. This process is not the same as the Elmore oil process. It uses less oil, so little that it is not thought worth recovering. Plants are operating in Cornwall and in South Africa; others are being put in at Golden and at St. Eugene mine, B.C., also one proposed for the Bruce Mines.

This process, together with a grouping of the best properties, may work out a reasonable return from these ore bodies, which in the aggregate may be depended upon to to furnish a large tonnage.

There is not much prospect of a steady development under the present conditions, for the smelter propositions await the development of ore supply, and the would-be miners await the smelters, so that they may realize upon their ore as they develop their mines.

It seems curious that this ore, so prevalent and in a way so unique throughout so wide a district southwest of Sudbury, is seldom met with in the northeasterly direction of the similar rocks towards Temagami and Temiskaming. There is, near Bear Island, on Lake Temagami, a property of Gibson and Dunlops' which is very similar in appearance, but usually copper showings do not follow the Bruce Mines type in form or contents.

In connection with this Sudbury-Soo district there is a lamentable absence of geological maps, or reports since the days of 1863 and Sir William Logan. Either the Provincial Bureau of Mines or the Dominion Geological Survey should investigate this portion of Ontario's great mineral-bearing strip.

ELECTROPLATING WITH CADMIUM.

The difficulties of electroplating with cadmium have been recently overcome, thus opening up an important use for the metal, which is now obtainable at a moderate price. The best results have been obtained from specially prepared cadmium carbonate, carefully purified, although the commercial salt has proven fairly satisfactory. The cadmium carbonate is dissolved in a solution of potassium cyanide, forming a clear, bright yellow plating bath, and a cadmium plate is used for the anode. A perfect deposit is had with either a hot or a cold both, a temperature of about 125 degrees F. being preferred. The coating, though soft, is harder than silver, and the color is as white as tin but not so white as silver. The surface, which takes a very high polish, is not readily tarnished by sulphuretted hydrogen or other vapors.

BRITISH COAL.

The *Iron and Coal Trades Review*, December 20th, points out that some years an accepted axiom of Great Britain's coal trade was that the price of coal must be kept low so as to stimulate business. The experience of 1906 and 1907 has changed this. Although coal deposits for foreign lands are being worked on an unprecedented scale, yet British coal is in bigger demand than ever before. The hold of British coals upon the market is illustrated by the fact that the Germany Coal Depot Company, organized expressly for the supply of German coal to German ships abroad, has for some time relied almost entirely upon British fuel for its requirements on the Mediterranean or on the Atlantic.

MINERAL RESOURCES OF THE UNITED STATES IN 1906.

The twenty-third annual volume of the series, "Mineral Resources of the United States," published by the United States Geological Survey, is now passing through the press. This volume contains a statement of the production of mineral substances in the United States during 1906.

Practically the same form of arrangement has been preserved in all of the twenty-two preceding volumes of the series, and it has become so familiar to the mining fraternity as to render any description unnecessary. But for those to whom this volume comes as a new book of reference it may be explained that the book is divided into chapters, each of which treats of a separate mining industry for the whole United States. The student who consults this report to find a combined statement of the

mineral resources of a given State is referred to the tabular statement of output by States in the summary and to the index, in which, under each State, is a list of the minerals produced therein. The effort is also made to show the conditions of the domestic industry in relation to foreign conditions in the same mineral industry.

It is important, also, for the new reader to know that this volume is simply the consolidation of the separate chapters after they have been published in pamphlet form, frequently months in advance, and that these pamphlet reports, and not the final volume, mark the dates at which the reviews become available. Further, for greater statistical promptness, it is the custom of the Survey to give the principal figures to the public press in advance of the publication of the chapters in pamphlet form.

Several new names appear in this volume for 1906 as the responsible authorities in charge of individual chapters. This is in pursuance of the policy of the Geological Survey announced in the volume for 1905 of assigning all subjects to members of the Survey staff who, in this work and in allied problems, are employed solely in the Government service.

The report on iron ores for 1906 was prepared by Mr. Edwin C. Eckel, who, in past years, has made a special study of the iron ores of the south. The series of iron ore reports for the United States owes its statistical development entirely to Mr. John Birkinbine, of Philadelphia. Under his direction the statistics of iron ore production have been developed to an exceptionally high degree of accuracy. This has been due, fundamentally, to the great confidence given him by iron ore producers, among whom Mr. Birkinbine has developed a spirit of fraternity similar to that which Mr. James M. Swank, the general manager of the American Iron & Steel Association, has evoked among the iron and steel manufacturers.

The reports on copper, lead and zinc in preceding years have likewise been developed entirely by Mr. Charles Kirchhoff, of the "Iron Age," New York. These reports have become classic for their statistical accuracy and for their keen and fair analysis of the trade situation. The report on copper for 1906 was made by Mr. L. C. Graton, and those on lead and zinc by Mr. J. M. Boutwell.

This volume also records the change of the administrative head of the division of Mining and Mineral Resources from Dr. David T. Day and Mr. Edward W. Parker, Dr. Day devoting his time to the important work of preparing the reports on petroleum and natural gas.

The change of administration includes the placing of the statistics of metal production (except iron ores) under the supervision of Mr. Waldemar Lindgren, who has, as chief assistants, Mr. Chas. G. Yale of San Francisco, Mr. Victor C. Heikes of Salt Lake City, Mr. Chester Naramore of Denver, and Messrs, Boutwell, Graton, McCaskey and Siebenthal, of Washington. This arrangement has materially strengthened the work of the division.

It is designed also to supplement the statistical data with the results of geological and chemical research in so far as they pertain to the economic development of our mineral resources. The Division of Mining and Mineral Resources has been for some time an integral part of the Geologic Branch of the Survey, this incorporation having been acomplished when the present plan of organization was adopted.

By way of brief review and summary of the series, it may be said that in the twenty-seven years covered by these twenty-three reports, the scope of the work has remained practically the same—an annual review of the mineral production of the United States and of the state of knowledge of the mineral deposits from which the products come. But the work involved has multiplied in two directions. In the beginning the statistical feature of the work was satisfied by an estimate as to the total output of each useful mineral. This estimate was based upon the best commercial estimate available, and the statistical correspondence was limited to a few hundred letters each year. When the control of the work passed into the hands of Dr. Day he took it with the intention of developing each statistical inquiry from an estimate into an accurate annual census through confidential reports at first hand, as rapidly as facilities would permit. This result has now been achieved with every industry except petroleum, and to this particular and difficult task he will henceforth limit his work. The correspondence necessary for this annual census of the mines of the United States has grown from a few hundred letters to an average of three written or printed communications a year to every known mine operator of the United States, more than one hundred and fifty thousand in all. In order to make such correspondence successful it has been necessary to send agents to the mines themselves, both for scrutiny of the statistical returns and in order to acquaint the operators with the nature of this inquiry and thus to secure the co-operation essential to success.

This growth of statistical work would have been necessary even if the mine development had remained stationary. Instead, the rate of increase has been far beyond all reasonable prophecy. In the twenty-seven years from 1880 to 1906, inclusive, the value of the mineral output of the United States has increased nearly five and one-fourth times. This marvellous growth is of additional interest in that it shows approximately by its fluctuations the financial ebb and flow of the whole country. From $364,928,298 in 1880, the value has risen gradually to the immense sum of $1,902,517,565 in 1906. This is the value of the mineral products in their first marketable condition, as shown in the first large tabular statement of the summary, where all unnecessary duplication is excluded.

It is of interest to note in passing that Pennsylvania produced nearly $600,000,000, or about 30 per cent. of the total value of the output of 1906; Ohio about $200,000,000, or 11 per cent.; Illinois, $117,000,000, or 6 per cent.; New York and West Virginia, $81,000,000, or 4 per cent. each; Montana, Colorado and Michigan, 3.5 per cent. each; Arizona and Missouri, 3 per cent. each; Alabama and California, 2.5 per cent. each. The value of the mineral output of each of the twelve States named was in excess of $50,000,000. If the combined value of output of eleven of these States ($905,000,000) be deducted from the total $1,902,000,000) the value of output of the twelfth State, Pennsylvania ($583,000,000), exceeds the combined value of output of all the remaining States of the United States by more than $150,000,000.

Keeping pace with this growth has been a system, and it is gratifying that the system has so expanded that the statistics of this wonderful production continually increase in completeness and accuracy. This attainment is largely the result of the hearty co-operation of the producers, due to their faith in the Survey.

In carrying out the plan of co-operation with the other divisions of the Geologic Branch a twofold advantage is secured. It brings to the statistical work on the one hand

a corps of trained men whose field observations have developed a keen appreciation of the geologic and economic importance of each mineral product. This has been particularly illustrated in the reports made by Mr. Lindgren and other mining geologists on gold and silver in the volume for 1905 and the reports on the same subjects and also on copper, lead, zinc and quicksilver in the present volume. On the other hand, the mining geologists have obtained and will continue to derive from their statistical work an insight into the industrial and commercial conditions which so largely affect the demand for the different minerals and lead to the search for and the development of the mineral deposits with the geological relations of which their field work makes them acquainted.

The bringing together of these two classes of study of our mineral resources, that of their geology and manner of occurrence, and that of their statistics and economic conditions, is to be one of the special features of the future work of this division.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

By E. Jacobs.

(Continued from last issue.)

The returns are not yet in from all the lead-producing mines, consequently there may be the necessity later of reducing the quantity now shown as the approximate production. On the other hand, the former appears to have been based upon information obtained from the lead smelters of the province, the output of which and the estimated quantity shipped abroad are indicated in the following preliminary figures:—

From.	Lb. of lead
Hall M. & S. Co's smelter, Nelson	6,329,243
Con. M. & S. Co's smelter, Trail	21,686,079
Sullivan Co's smelter, Marysville, and others	10,631,036
Exported to United States and Europe	7,900,995
Estimated production in 1907	46,547,352

Even should the revised figures, when obtained, confirm the Provincial Mineralogists's estimate, there will still be a decrease in value of this metal of $348,714, of which, however, $140,000 is attributable to the lower average price in 1907 as compared with that of 1906.

East Kootenay's production of lead was about 38,000,000 pounds, the larger proportion from the St. Eugene mine; the Sullivan was the only other important producer in this district. In the Slocan section of West Kootenay, the Whitewater was the largest producer with something like 2,700,000 pounds. The Standard, Vancouver group, Hewitt, and Rambler-Cariboo, were other Slocan producers, while the La Plata, in Nelson mining division, and the Silver Cup, in the Lardeau, also shipped a considerable tonnage of silver-lead ore.

The closing of the Hall Mining & Smelting Company's smelter at Nelson, and a temporary suspension of smelting operations at the Trail smelter while there were labor difficulties at Crow's Nest Pass coal mines, whence comes the supply of coke, in a measure interfered with the production of silver and lead ores.

Copper.

The closing of the Boundary district copper mines, and others in the Nelson and Coast districts, respectively, during several weeks of November and December, effectually prevented an increase in the year's production of copper over that of 1906. There was also a restricted output during the spring owing to a shortage of coke for the smelters and an occasional insufficiency of railway cars for ore and coke-hauling purposes. These adverse conditions resulted in a decrease of rather more than 10 per cent. in quantity of copper produced. If calculated at the average price for 1906 the loss in value would be nearly $900,000, but as that for 1907 was about three-quarters of a cent a pound higher, the production for this year shows a net loss of only $610,000. When it is remembered that nearly 75 per cent. of the year's production came from the Boundary district, the effect of the closing of its mines during two to three months becomes evident. The Boundary's proportion of the total production of 38,392,000 pounds was nearly 28,000,000 pounds; Rossland and the coast each produced rather under 5,000,000 pounds; Nelson division's share was somewhere about 400,000 pounds. Of the 1,140,000 tons of copper ore shipped by Boundary mines, those of the Granby Company contributed 625,000 tons, of the British Columbia Copper Company 235,000 tons, of the Dominion Copper Company 155,000 tons, and of the Consolidated Mining & Smelting Company 125,000 tons. Rossland camp's ore tonnage was about 280,000 tons, in the following approximate proportions: Consolidated Mining & Smelting Company's Centre Star-War Eagle group 132,000 tons, Le Roi 113,000 tons, Le Roi No. 2 23,000 tons, and sundry smaller shippers 12,000 tons. On the coast the tonnage was approximately 100,000 tons, as follows: Britannia 57,000 tons, Tyee 12,000, Outsiders 9,000 tons, Marble Bay 7,000 tons, Richard III. 4,000 tons, Lenora, 2,000 tons, and sundries 9,000 tons. The Queen Victoria, near Nelson; the Outsiders, Portland Canal, and the Ikeda, Queen Charlotte Islands, were new producers, and the Richard III. and Lenora, Mt. Sicker, Vancouver Island, resumed ore shipping after having been non-producers for several years.

Iron and Zinc.

There was no considerable quantity of either iron or zinc ore shipped during 1907. At Vancouver and Texada Islands a few thousand tons of iron ore were mined and shipped to Irondale, Puget Sound, Washington, U.S.A. The most important event of the year in connection with the iron ores of the province was the examination by Einar Lindeman, a Swedish iron expert, of a number of claims taken up for iron ore on Vancouver Island and vicinity, for the purpose of reporting on them to the Dominion Department of Mines, Ottawa, which equipped him with the object of ascertaining whether or not iron ores occur in suitable quantity, variety, and quality, on the coast to warrant the expectation that an iron-manufacturing industry will eventually be established there. Mr. Lindeman's report has not been made public before returning to Ottawa in December he stated that of the many properties he had examined during his five months' work on the coast none of them could be considered

promising enough to warrant considerable development work to determine the extent of available ore; the quality he was satisfied with, but the quantity remained to be determined.

Shipments of zinc ore and concentrate were not large, and those made were from Slocan mines, several of which are, however, continuing to store the zinc concentrate made in milling ores for silver and lead. The uncertainty as to the final decision regarding the imposition of a duty on zinc ore sent to the United States remains an obstacle to much of this product being shipped to United States smelters. A comparatively small quantity was exported to Europe from a Slocan mine. No progress appears to have been made in the direction of operating on a commercial scale the Canadian Metal Company's zinc smelter at Frank, Southwest Alberta.

Coal and Coke.

The production of coal in 1907 was the largest in the history of coal mining in the province. The net increase over 1906 was 339,000 tons (2,240 pounds), this bringing the year's production of coal disposed of as such up to 1,856,600 tons. All three of the larger companies shared in this increase. There were about 357,000 tons made into coke. The respective approximate proportions of production were:—

Company.	Tons of 2,240 lb. Gross. Tons of 2,240 lb.	Tons of 2,240 lb. Net. Tons of 2,240 lb.
Company.		
Wellington Colliery Co.—		
Extension mines.. 434,000		
Comox mines ... 391,000		
	825,000	795,000
Western Fuel Co.—		
Nanaimo and Northfield mines	500,000	500,000
Totals for Vancouver Island	1,325,000	1,295,000
Crow's Nest Pass Coal Co..	877,442	550,600
Nicola Coal & Coke Co.....	11,000	11,000
Total production in 1907..	2,213,442	1,856,600

The Nicola Coal & Coke Company has been operating only about a year and most of its comparatively small production was of coal taken out in opening its mine. Several other companies will shortly be in a position to mine coal in quantities up to a few hundred tons a day each.

The coke output of the year was 227,000 tons—210,000 tons from the Crow's Nest Pass Coal Company's ovens at Fernie and Michel, and 17,000 tons from the Wellingtons Colliery Company's ovens at Union, Vancouver Island. In this year's estimate coal has been valued at $3.50 a long ton and coke at $6. In former years the respective prices were taken as $3 and $5, but the former are considered by the Provincial Mineralogist as average local market values for 1907.

The foregoing estimate differs from one made by the present writer early in December and sent to another mining journal. During the three weeks that have since elapsed, however, much more information has been obtained, hence the differences in the figures.

THE DEVELOPMENT OF THE LASH PROCESS FOR MAKING SOFT STEEL IN THE ELECTRIC FURNACE.

The Canadian Lash Steel Process Company, Limited, an Ontario organization, capitalized at one hundred thousand dollars ($100,000), and having among its stockolders a number of prominent men in Canada, has just about completed, and will have in operation inside of six weeks, the largest installation of an electric furnace for the making of soft steel ever attempted.

This company has purchased a building at Niagara Falls, N.Y., and is installing therein a fully equipped steel plant, to be operated in connection with a 1,000 horse-power Heroult furnace, for the purpose of making steel by the Lash Process.

The Lash Process consists of making a mixture of concentrated magnetic ores, or iron ore sands, granulated pig iron and carbon, and charging the same into either an electric or O. H. furnace and producing steel. It is not a direct process in the strict sense of the word, but is an ore and pig process, the ore, however, being greatly in excess of the amount of pig iron used, and practically eliminating the scrap, using only such scrap as is made in the regular operation of a steel works.

The amount of pig iron required to make a ton of steel is less than one-half of what is required in regular open hearth practice, when the mixer is used in an electric furnace, on account of its non-oxidizing atmosphere; this feature, coupled with the fact that the rest of the mixture is iron ore, which is, of course, the cheapest source of metallic iron, will produce a ton of steel ingots at a price much lower than they are produced in regular practice, either in the United States or Canada, figuring the electric power required at its regular market price as sold in large quantities.

Canada, beyond a doubt, with its vast deposits of magnetic ores and iron sands, and its water powers, should be able through the development of some such process to become one of the largest steel producing countries, and command an immense export trade. This company having previously made a number of experiments on a moderate scale, in which the results were encouraging, have installed this large plant for the purpose of making a practical demonstration on a commercial basis. The plant was located at Niagara Falls, N.Y., solely for the purpose of gaining time, this location making it possible to procure immediately a building, transformers, and the power required for their installation.

The supervision of the plant is under the immediate direction of Messrs. Fitzgerald & Bennie, of Niagara Falls, N.Y., and Robert Turnbull, of St. Catharines, Ont., the Canadian representative of Dr. Heroult, whose furnace they will installed.

Arrangements are being made with two of the best metallurgical and electrical experts in the world, one from England, and one from the States, to examine the process and make a full report. These experts will have every facility afforded them to watch the operations as the plant as before stated is being completed, with its laboratories, cranes, casting pits, etc., so as to operate night and day at a capacity of from 25 to 30 tons of steel per day. The steel after being cast into ingots will be sent into Canada to be rolled, and not only its chemical composition ascertained but also its physical qualities. The steel will then be shipped into the regular channel of trade.

Mr. Horace W. Lash, the president of this company, and the inventor of this process, has been connected for

years with the steel-making industry, and it was only after a long series of tests conducted by himself and a number of demonstrating heats made in the regular open hearth practice, that he permitted the process to be advanced as a commercial proposition. As to its use in regular open hearth practice, there seems to be no doubt as to the results.

Repeated tests show a yield above the average, a quality of steel entirely satisfactory, and a conversion cost not in excess of regular practice. Then it has been clearly shown that a better quality of steel is made, when the same is produced direct from the ore, instead of through the scrap and pig process.

In the electric furnace the quantity of pig iron required is very much reduced, owing to its being smelted in a non-oxidizing atmosphere. As pig iron is the most expensive material used in the making of steel, the reduction of its proportion results in a corresponding saving, and when the use of this pig iron is coupled with the ores themselves, the cost of producing a ton of ingots is much lower than the best practice ever brought out.

This process is, of course, a most interesting development for Canada, which country does not possess the required fuel, but does possess the water powers and the raw material; therefore, the results of these experiments will be most interesting. We are promised a report of these results after the plant is in operation.

Briquetting of Fuels in British Columbia—Description of Pacific Coal Company's Plant at Bankhead, Alberta.

By G. J. Mashek.

(Continued from last issue.)

All bearings are self oiling and the registering gears that actuate the second roll are also cut and have very wide face so as to practically eliminate any wear in that portion of the machine.

Figure 4, shows the type A Mashek briquetting press as installed in this plant. The briquetting rolls in these machines are made up of discs as shown in Fig. 5. The briquettes made in this machine are pillow-shaped, rectangular in one direction about 2 1-8 inches square by about 1 3-8 inches thick.

The object of making the press rolls of discs, all sides of which are machined, was for the purpose of making it possible to mill out the briquette pockets, as up to the time these machines were built it was found impossible to cast rolls in one piece.

The face of the roll shows dividing ridges about 1-6 inch wide between the briquette pockets, so that the full face of the roll is used at all times, making no waste and leaving no fines on the briquettes, as is common with the eggette shape made by the Belgian type press. This also saves a considerable amount of power in operating the machine. The power required is about 22 H. P. to turn out 12 tons per hour. The rolls made in this manner are the most expensive part of these presses and owing to the fact that the material from which they are made had to be soft enough to be machined and milled, considerable wear on these parts was caused, which required frequent renewals. This problem has within the last year been overcome by making the roll shells in one piece with pockets cast in, the material being so hard that it was necessary to grind the outer edges of the pockets. The life of this roll shell is about three times that of the built up one with milled pockets.

The construction also enables the machine to make better shaped briquettes leaving the corners more blunt. The briquettes drop out of the briquetting rolls on a belt conveyor and are taken to a distributor placed over a travelling cooling table, where they are dsitributed evenly over a width of 6 feet.

The cooling table consists of three endless belts made up of heavy roller chain, one chain on each side, running on channel iron tracks with spacing rods between the chains, on which are placed steel plates about a foot wide. These plates are held in the horizontal position by means of tee iron tracks, and as they approach near the end of their run the track drops away and the load is gently lowered and discharged on the other side of this same belt. The briquettes thus pass from one course of the cooling table to the other until they are thoroughly cooled. At the bottom they are delivered to a scraper conveyor as shown, which conveys them to the shipping bins of the breaker allotted for this purpose. The briquettes remain on this cooling table about one hour. It is absolutely essential in all briquetting plants, if the

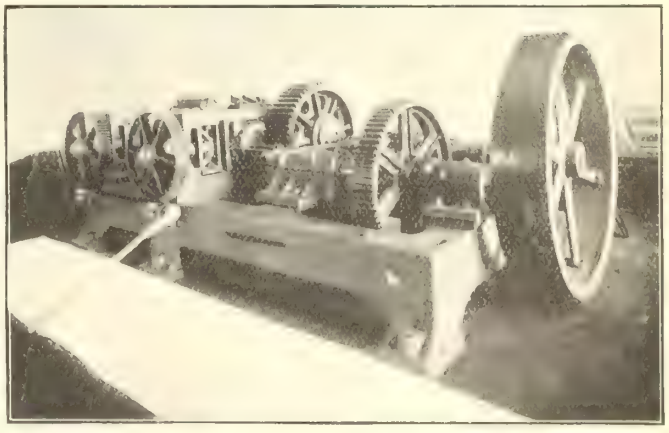


Figure 4.—Type A, Mashek Briquetting Press.

product is to be dropped into bins, that the briquettes be thoroughly cooled so as to avoid the possibility of smashing them on account of the inside of the briquette being still hot, although the outside may appear cool. Once the briquettes are thoroughly cooled there is absolutely no danger of them softening again in any temperature, nor is there danger of spontaneous combustion.

The pitch used in this plant is of ordinary roofing hardness, and grade D oil residuum asphaltum would be just as suitable for this purpose.

The pitch melting is done in a separate house as shown in Fig. 1, where the barrels are hoisted by a barrel ele-

vator to the second floor. On this floor the barrel staves are removed and the contents are dumped into any one of the three melting tanks. These melting tanks have a capacity of about 18 tons each and are set in brick-work heated by means of coal fires. They are set in such a manner that direct heat from the fire does not strike any part of the tank, thereby avoiding any danger of carbonizing the pitch, or of overheating any portion of the melting tank.

It requires from 20 to 24 hours to melt a tank full and raise the temperature of the pitch up to about 250 degrees F. After the pitch is melted it is pumped by means of a pitch pump through a 4-inch pipe to a similar tank in the briquetting plant, out of which it is being continually used while the plant is in operation. Three melting tanks are sufficient to keep this plant going 24 hours per day, although if more were installed the melting could be done a little slower which would also provide a reserve capacity at a vital point of the plant. Each unit of the briquetting plant is operated by a double 14 x 20 cylinder engines. The steam for the plant is obtained from the breaker boiler house, placed some distance away. For the atomizing purposes it is absolutely essential that the steam be dry and as hot as possible. For this purpose there is a steam superheater next to the melted pitch tank.

All the machinery shown on the plan is placed on the ground, the building is a frame structure of just sufficient strength to withstand the snow loads and carry the over-head line shafts. The cost of this plant complete according to original estimates was as follows:—

Machinery, F. O. B., New York, 350,000 pounds	$40,053.00
Duty 25 per cent.	10,000.00
Freight at $1.80	6,300.00
Building and erection of machinery.	29,000.00

The total cost of the plant as outlined is $85,353. This estimate was later modified by buying a large portion of the equipment in Canada and saving the duty. The cost of operation per ton of briquettes after a carload sample had been briquetted in the United States is given below. This cost was arrived at by the writer and Mr. Bruce R. Warden, M. E., the Pacific Coal Company's representative, and all items were put in at the highest cost in order to be on the safe side.

Cost of Running a 2 Unit Coal Briquetting Plant.

Binder at $10.00 per ton at Fort william, $6.00 freight to Banuff using 7 1-2 per cent. gross cost per ton of briquettes	$1.20	
Deducting the increase of weight of briquettes by addition of 7 1-2 per cent., binder valuing briquettes at at $3.50 per ton, in bins of plant	.25	
Net cost of binder per ton briquettes		.95
Labor per day—		
1 Watchman	$2.50	
1 Dust conveyor attendant	2.50	
1 Cooling table and briquette conveyor man	2.50	
2 Men in binder melting room and general labor	5.00	
1 Oiler	2.50	
2 Men to run the two units	8.00	
1 Superintendent	6.00	
Total	29.00	
10 Hour day making 220 tons of briquettes per ton		.131

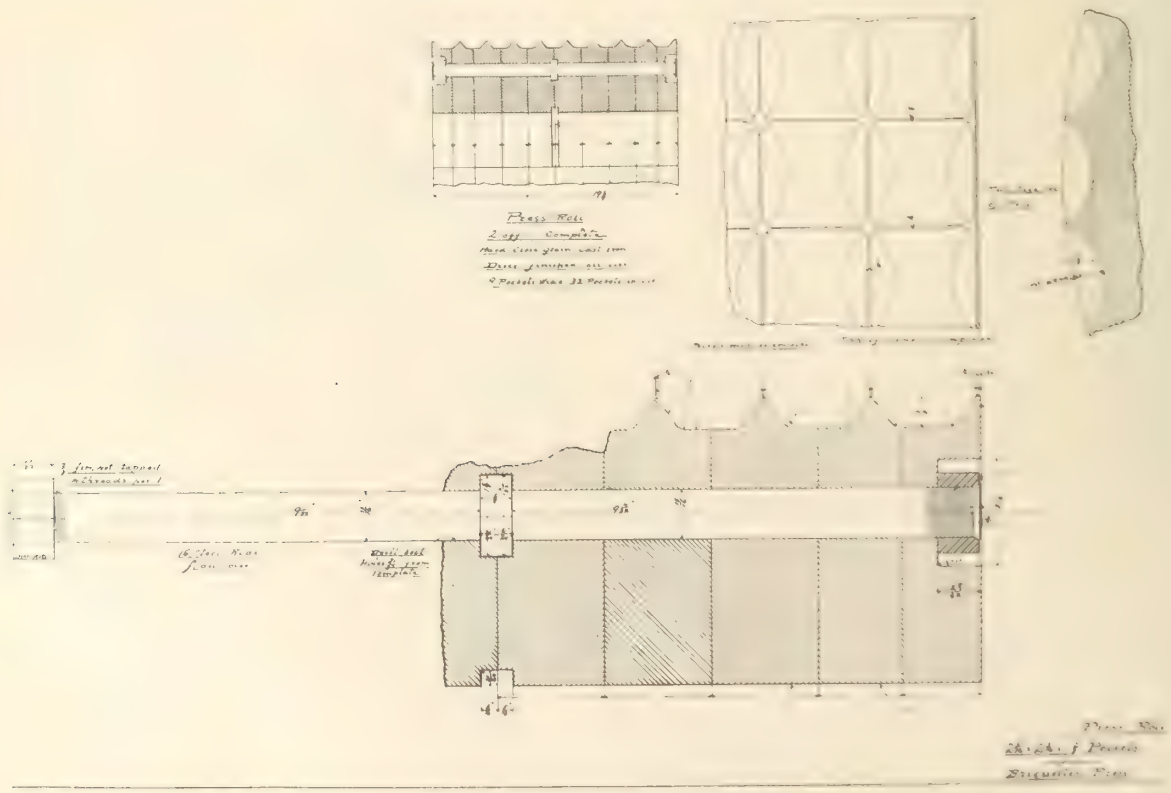


Figure 5.

Fuel Oil	
2 1-2 gallons per ton at 5 cents per gallon	.12½
Power—	
300 H. P. coal for boilers at 40 cents, engines using 50 pounds of steam per H.P., and heating plant, cost per ton of briquettes	.05
Lubricating Oil	
Per ton	.01
Breakage—	
Rebriquetting breakage of 5 per cent. between press and shipping cars	.04
FIXED CHARGES.	
Interest—	
Capital invested $86,000 at 6 per cent., plant produces a minimum of 50,000 tons per annum—per ton	.10
Depreciation, wear and tear—	
Per ton	.10
Insurance—	
$50,000 at .02 per cent., per ton	.02
Office expense—	
Bookkeeper, stenographer, stationery at $3,000 per annum	.06
Total cost of manufacture (coal dust not included)	1.59

It will be noticed that fuel oil is figured in at 5 cents a gallon, but as stated above it was found that this oil would cost considerably more. Coal furnaces instead of oil furnaces were therefore installed to heat the dryers and mixers. This item, therefore, should be cut out and the cost of coal for this purpose put in. The cost of coal, however, is considerably less than oil.

As this plant was originally planned and designed as shown in Figure 1, only one unit of the briquetting machinery was installed. After that was in operation about a year the other unit was put in which at the present time ought to be about ready to start. The single unit has recently produced 9,100 tons of briquettes per month.

The atomizing of the pitch into the mixers as described about is patented in Canada and the United States, for the use of which there is a royalty of 10 cents per ton charged by the owners. There are a number of these plants in operation in the United States, equipped with a later design of press, and other improvements in mixers, etc. Also an improved method of introducing pitch into the coal dust has been developed and patented. This apparatus is sold outright and no royalty charged.

EXAMINATION OF WELL WATER AT COPPER CLIFF.

J. W. RAWLIN.

During the summer and fall of 1906 the Town of Copper Cliff suffered severely from an epidemic of typhoid. An examination of the water in many of the wells showed extremely high chlorine, and the worst of them were closed. Samples of the water were also sent to Toronto, to be tested at the laboratory of the Provincial Board of Health.

Owing, however, to the length of time that necessarily elapsed while the samples were in transit, the results returned were not very satisfactory.

It was felt that the only really satisfactory method was to test the water on the spot, and, during the winter of 1906-07, the Canadian Copper Company took the necessary steps to effect this, and, if possible, forestall a recurrence of the fever the following summer. With the assistance of Dr. Amyot, Provincial Bacteriologist, the necessary supplies and apparatus were purchased, and a competent man secured to carry out the tests. A room in the new laboratory was set apart especially for water analysis, and the systematic testing of the wells begun in May, 1907, with Mr. C. E. Rowland in charge.

In addition to the usual chemical tests for chlorine, free and albuminoid ammonia, a fairly complete bacteriological examination was also made, and indeed this proved much the more valuable. It is especially worthy of note that many of the wells that gave a low chlorine test proved really to be badly contaminated. This was undoubtedly due to infection from the pails used in dipping out the water, each one bringing his own pail and using it for that purpose. The remedy in this case was simple. The well was thoroughly cleaned, and provided with a bucket fixed at the well, or with a pump.

There were other wells, however, which showed high chlorine in conjunction with high bacteriological contents. These were evidently contaminated with sewerage and were closed. At others, which could only be called doubtful, notices were posted warning the users to boil the water for drinking purposes. The nature of the soil here makes it a very efficient filter, and, if a well were protected from surface contamination and sunk in a reasonably good place, the water obtained is excellent.

All glassware used in connection with the bacteriological tests was sterilized in a dry heat at about 150 degrees C. The sample, after being collected in a sterile, glass-stoppered bottle, was brought at once to the laboratory, and usually three tests made as follows:—

(1) A 1 C. C. portion was sown in agar-agar in a Petri dish, and left in a dark, moist place at the ordinary temperature, and afterwards the colonies were counted. Unless the count here were extremely high, water was never condemned on this test, as most of the bacteria growing at this temperature are quite harmless.

(2) Another 1 C. C. portion was also sown in agar-agar in a Petri dish, but incubated at 37 to 40 degrees C., and the colonies counted, using a Wolffheughl counting apparatus. Any growth at this temperature, which is approximately that of the body, was pretty certain to be dangerous, and, if obtained in addition to gas formation in (3), was considered sufficient evidence to condemn a well.

(3) A third 1 C. C. portion was introduced into a fermentation tube (a U tube with one closed arm) containing a meat broth and incubated at 37 degrees C. A gas formation in the closed arm, of which approximately 33 per cent. was CO_2 and the balance H, gave a practically certain proof of the presence of colon bacilli. Microscopic slides were made from the fermented liquid, and, under a high power miscroscope, the presence or absence of streptococci and staplylococci noted. Slides were also made from different colonies on the agar-agar, and the bacilli in these determined. Other slides were stained with the approprivate colors for examination under oil-immersion lens.

Ordinarily the above tests were sufficient, but many others were made, such as growths on litum-lactose-agar plates, cultures in agar tubes, etc., for further confirmation. Using a quantity of the water as large as 1 C. C. made the test a somewhat severe one, but, under the circumstances, it was better to err on the side of severity than pass a water which might only have been termed doubtful if a smaller quantity had been used.

It is satisfactory to be able to record the fact that, owing to the measure taken, the town was practically free from typhoid during 1907. There were two or three cases only, and these of a comparatively mild type.

MINING IN THE KOOTENAYS, ETC.—A SUMMARY OF THE PAST YEAR'S WORK.

George A. Ohren.

The year which has just closed would have been a banner one for the Kootenays in the way of ore production had it not been for several drawbacks. In the early part of the year we had the transportation difficulties to deal with, then the trouble between employers and labor in the Crow's Nest Coal fields, car shortage, a hitch in the labor situation in the copper producing district, and what hurt most, the shortage of coke and fuel, which affected nearly all of the mining and smelting communities. However, taking the production and the business for the year it was a very good one for the mining industry here, and even with all the difficulties that cropped up, the total tonnage nearly came up to that of the year 1906. If things go at all smoothly during the year that now lies before use, we will be able to report a list of production and values that will beat anything that has been recorded heretofore. Of course this will depend to a greater or less extent on the values of copper, silver and lead strengthening a little above what they are at present, which is something we are all looking for.

In the Rossland district we can well say that things have taken a step forward; this applies more particularly to the operations of the Consolidated Mining & Smelting Company of Canada here. They have acquired a lot more territory, have done much development work on it, disclosing new ore bodies, have installed an up-to-date electrical and compressed air plant for mining and hoisting the ore, and to make a long story short have an excellently equipped and working property, with more ore in sight than they ever had before. This property is now down a depth of over 2,000 feet, and work is planned for still further depth.

At Le Roi mine they have not seen fit to add much more machinery to their already well furnished plant, and the principal improvements there during the past year have been in the way of development work, the cardinal part of which was the sinking of the main shaft from the 1,450 to the 2,000 foot levels and prospecting the ground between by drifts, winzes, diamond drill, etc. While the profits have not been enormous for the year's work, partly owing to the heavy expenditures for all this preparatory work, still the mine is looking well and there is ore enough in sight to keep the plant going for several years.

The Le Roi 2, Limited, has worked along steadily during the past twelve months mining and shipping some very fine copper ore and milling many tons of second-class ore. The company has by good management and rigid economy made money and can no doubt excel their record during 1908.

The Granby mines in the Boundary have acquired a lot more ground and have added materially to their machinery plant. They have increased their smelting capacity; have put in a couple more of the fifty-two ton crushers, etc.

The Consolidated Company at the Snowshoe mine have made great progress. They have opened up a lot of good shipping ore, which is of primary importance, have acquired an extensive group of mineral claims, and have added more air compressing machinery, electrical locomotives for underground haulage, etc.

The British Columbia Copper Company have also made many improvements about their property, have augmented their crushing plant by a monster crusher, are installing a new rope driven compressor, and have the mine working in fine condition with plenty of ore blocked out and development work well advanced.

The Dominion Copper Company installed two new compressors and more blast furnace capacity, besides other smaller additions, and are in a good position to make money during the coming year. It is anticipated that they will be in operation again in the next two or three months.

In the Slocan-Kootenay district the Consolidated Company's St. Eugene mine, the Sullivan, La Plata, Eva and other well known properties have all advanced in the way of improvements and now stand a step higher up the ladder than they did at this time a year ago.

Following are the ore shipments from Rossland for the calendar year ended December 31st, 1907, estimated:—

	Tons.
Centre Star mines	137,500
Le Roi	113,538
Le Roi 2, Limited	23,500
Le Roi 2, Limited (milled)	2,470
White Bear	2,729
White Bear (milled)	3,350
Others	253
	283,340

From the Boundary:—

	Tons.
Granby	613,567
Mother Lode (B. C. Copper)	208,321
Snowshoe (Consolidated	128,674
Rawhide (Dom. Copper Co.)	64,173
Brooklyn (Dom. Copper Co.)	44,101
Sunset (Dom. Copper Co.)	31,258
Emma (B. C. Copper)	18,274
Providence (high grade)	708
Others	39,259
Total	1,148,337

From Slocan-E. Kootenay:—

	Tons.
Sullivan	31,500
St. Eugene (Cons.)	23,067
La Plata	3,250
La Plata (milled)	20,000
Eva (milled)	6,500
North Star	2,889
Rambler, Cariboo	538
Ymir	305
Payne	55
Others	97,743
Total	185,857

Aproximate smelter receipts were as follows:—

	Tons.
Trail smelter (Consolided)	266,994
Northport smelter (Le Roi)	101,178
Granby, Grand Forks	628,001
B. C. Copper, Greenwood	326,295
Dominion Copper, Boundary Falls	154,793
Hall M. & S. Co., Nelson	11,340
Marysville (Sullivan)	31,850

The Crow's Nest Pass Coal Company, the largest producer, mined:

	Tons.
Coal	982,735
Manufactured into coke	366,076
Exported to U. S.	327,100
Shipped to Canadian points	237,459
Sold locally	2,949

The Provincial output, taking it all around, showed an increase of $4,636,625. Estimated value of the grand output is:

Gold, placer	$ 700,000
Gold, lode	5,426,500
Silver	1,900,000
Lead	3,000,000
Zinc	125,000
Copper	9,874,000
Total metalliferous	$21,025,500
Coal	6,490,000
Coke	1,135,000
Building material	1,200,000
Total production	$29,850,500

Taking it all in all there is no complaint to make about the production from the British Columbia mines for 1907 and when it is all boiled down there is a balance on the credit side of nearly five million dollars, which goes to bear out what we have tried to indicate in the foregoing, that the mining industry has steadily marched forward during the past year and to-day occupies a much more prominent position than it did a year ago.

The year 1908 opens out in a most propitious manner for the mining industry and if the metal market will only pick up a little there is little doubt that the records on the 31st of December next will far exceed those mentioned above, for labor seems to be on a most amicable footing with the employer here, transportation facilities are in very good condition and the mines are in better position than they have been for a long time to make record breaking shipments.

TUBE MILLS.

The following article is interesting, not only to parties who are in some way connected with the construction or use of the special machines herein described, but also to students, or others, who have an interest in mechanism. The article proves that by changing the method of applying the power to drive such machine, an immense saving of power can be accomplished.

The accompanying cuts give an illustration of two rotary pulverizing cylinders, also called tube mills, or pebble mills. One of these cylinders is resting on journals in bearings (Fig. 1), extending from the heads of cylinder. The other cylinder, with its steel tires fastened around the same, rests on wheels (Fig. 2). Both cylinders are loaded up to the centre. The first, the gudgeon cylinder, is operated by a pinion on a countershaft driving a gear wheel. This gear is generally placed around the circumference of the head of the cylinder, and the motion transmitted by the pinion to the gear wheel rotates the cylinder around its axis, and thus in the cylinder of the style of Figure 1 the entire load has to be lifted about its axis in its operation. The other cylinder (Fig. 2) has no gear wheel around its head, and has no axis about which the load has to be lifted. The power to rotate the cylinder, as in Figure 2, is

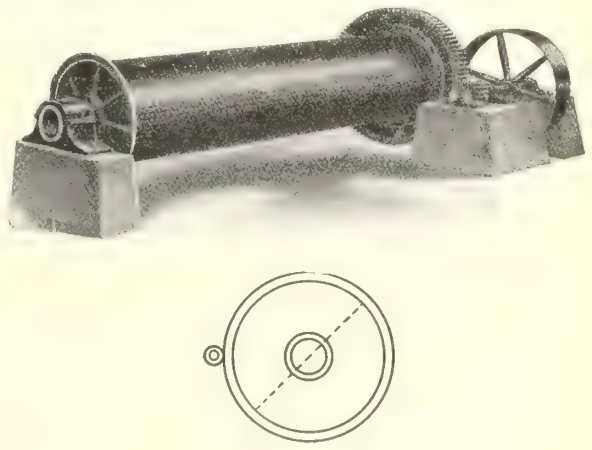


Fig. 1.

transmitted by rolling friction, by the aid of the centre driving wheels, on which the cylinder rests. The entire weight of the load and cylinder is balanced on the centre driving wheels, and when the motion is transmitted to rotate the cylinder, half of the load is balanced on the centre driving wheels, and consequently only one-half of the entire load must be lifted while the cylinder is in operation.

The inventor of this device, Mr. R. F. Abbe, president of the J. R. Alsing Engineering Company, of 136 Liberty street, New York, who handles his inventions, claims and intends to prove theoretically by the following explanation the amount of power that can be saved in driving such machine with his patented driving system, although it might be mentioned that practical demonstration has proven a higher percentage of saving in power than is proven theoretically.

The simplest explanation of how the saving of power is accomplished is the following:—

For a Tube Mill as Style Shown in Figure 1, Old Style.

A tube mill or pulverizing cylinder, say 5 feet in diameter by 22 feet long, has to carry a load of about 23500 pounds, consisting of flint pebbles and the material

to be ground. The centre of gravity of the load is 1.6 foot from the centre of the tube mill, and as the mill makes 25 revolutions per minutes, consequently we have 23500 x 1.6 x 25, or 940000 foot pounds to lift about the gudgeon per minute.

There are 33000 foot pounds in one horse-power, hence 940000÷33000 equals 28.485 horse-power plus the friction and weight of the entire cylinder, and load on bearings, which is equal to 21.845 horse-power, of which 10.495 horse-power is for friction and 11.350 horse-power for weight of cylinder.

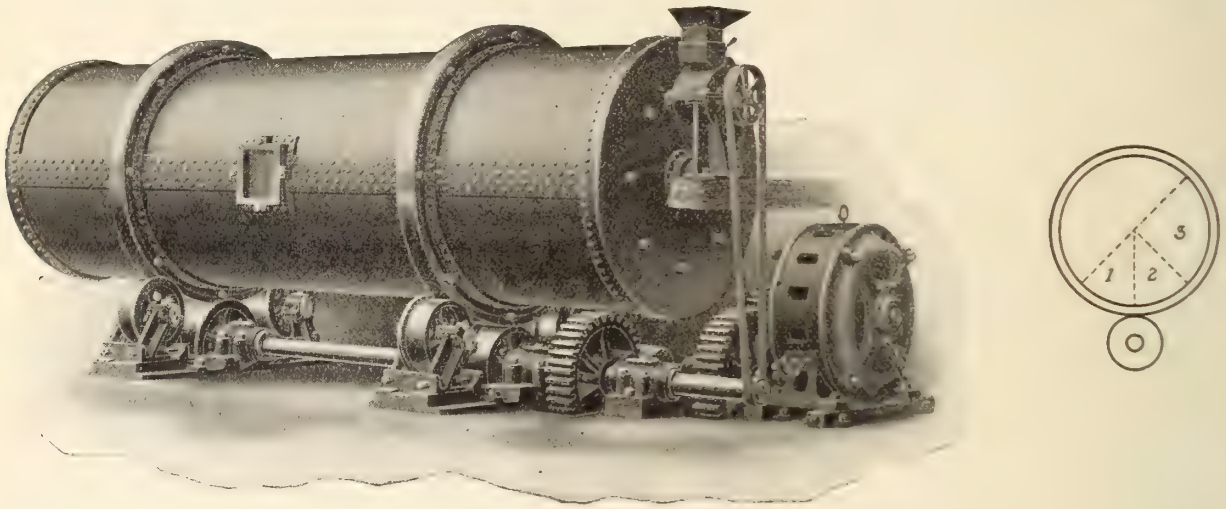


Fig. 2.

Thus 28.485 plus 21.845 equals 50.330 horse-power, which is required to operate a 5 foot x 22 foot tube mill running on gudgeons (Fig. 1).

For a Tube Mill as Style Shown in Figure 2, New Style.

With Mr. R. F. Abbe's patented driving system the tube mill rests with its entire load on the centre driving wheels, the two side wheels acting only as guides. As illustrated by sketch in Fig. 2, one-half of the entire load is balanced (section 1 balances section 2), and carried by the centre driving wheels. Therefore only one-half of the entire load is required to be lifted in this style of tube mill. Consequently it takes one-half of the 28.485 horse-power (which the other style of cylinder required for the same load), namely, 14.2425 horse-power. As the horse-power for friction and weight of cylinder is 18.4892, of which 7.1392 horse-power is for friction and 11.350 horse-power for weight of cylinder, then 14.2425 plus 18.4892 equals 32.7317 horse-power, which is required to operate a 5 foot x 22 foot tube mill with Mr. R. F. Abbe's patented system.

Therefore 50.330 minus 32.7317 horse-power equals 17.5983 horse-power actually saved by the use of this patented system. This shows 35 per cent. of the horse-power saved.

In the above calculations the weight of the cylinders has been assumed to be equal in both style pulverizing cylinders, although by actual detailed estimation it has been shown that on account of the large gear wheel and heavy gudgeon heads used on the cylinder (Fig. 1) the same is heavier than the other cylinder (Fig. 2) by over 6,000 pounds, and thus this will increase the saving in power in the cylinder of Figrue 2 (patented driving device).

BOOK REVIEWS.

THE ELECTRIC FURNACE — ITS EVOLUTION, THEORY AND PRACTICE. BY ALFRED STANSFIELD, D.Sc., PROFESSOR OF METALLURGY IN McGILL UNIVERSITY. PUBLISHED BY "THE CANADIAN ENGINEER," TORONTO, 1907. PP. XI. + 211—9 BY 6. PRICE $2.00.

"In this book," Dr. Stansfield's introduction tells us, "it has been the author's purpose to trace the evolution of the electric furnace from its simplest beginnings, and to set forth, as briefly as is consistent with clearness, the more important facts relating to its theory and practice."

In seven chapters, following each other logically and smoothly, Dr. Stansfield traces the history of electro-metallurgy, describes and classifies electric furnaces, compares their efficiency with that of other fuel furnaces, goes briefly and completely into matters of construction, design and operation, dwells upon the uses of electric furnace products and concludes with a chapter on future possibilities.

The book is well written. It can be intelligently read by secondary students. It is thoughfully put together and amply illustrated. After reviewing the present sources of electrical power, Dr. Stansfield concludes by alluding to Lord Kelvin's suggestion that the ether may be a future source of limitless supplies of power. "We can," adds the author, "await with quiet minds the exhaustion of the coal supplies of the world."

A text book upon the electric furnace has been needed. The ordinary reader can derive but little benefit from special reports. Hence even a general knowledge of modern electro-metallurgy is rare. Dr. Stansfield has succeeded in presenting in compact form a crisp, understandable treatise on a subject of growing importance. His book is a well-digested summary of the latest and best literature.

MINING TABLES—BEING A COMPARISON OF THE UNITS OF WEIGHT, MEASURE, CURRENCY, MINING AREA, ETC., OF DIFFERENT COUNTRIES; TOGETHER WITH TABLES, CONSTANTS AND OTHER DATA USEFUL TO MINING ENGINEERS AND SURVEYORS—BY F. H. HATCH, PH.D, F.G.S., AND E. J. VALLENTINE, F.G.S. MACMILLAN COMPANY OF CANADA, LIMITED, TORONTO. PP. 200—8 1-2 x 5 1-2. PRICE $1.75.

The usefulness of this book will be at once recognized. In it are collected and arranged the tables of weights and measures used by the principal nations of the world. Definitions of units of force and energy are given. Amongst other most useful (but usually unfindable) information are tables of conversion of British, Metric and Russian units.

In Part V., under the heading "Data Specially Relating to Mining," are to be found tables of much more than usual value. In these both the long and the short ton are used. The tables giving ore tonnage per unit area for veins or beds one foot thick and of unit density for each degree of dip from 0 degrees to 85 degrees, are the outstanding feature of this chapter.

Section V. of Part V. defines briefly the unit mining area of different countries. The Transvaal Claim for vein and reef mining has an area of 60,000 square Cape feet. It is usually rectangular in form and measures 150 Cape feet along the strike by 400 Cape feet in a direction at right angles to the strike. The Cape foot, incidentally, is equivalent to 1.033 English feet.

Similar data are given for many other countries, including Canada. The fact that Alberta and Saskatchewan have been erected into provinces has, apparently, been overlooked.

Data relating to measurement of the flow of water, storage of water, flow in pipes, air, steam, along with trigonometrical and other formulae, surveying data, tacheometric tables, tables of chords, etc., etc., help to complete this well-compiled volume.

JOURNEYS OF OBSERVATION—BY T. A. RICKARD. PUBLISHED BY THE "MINING AND SCIENTIFIC PRESS," 667 HOWARD ST., SAN FRANCISCO. PP. 500. CLOTH, $3.50. AUTHOR'S EDITION, $5.00.

Although we had previously read most of the delightful letters that together make up the volume, it was a light and pleasant task to read them again.

The author, in his preface, remarks that "this book records the observations made by a traveller who happened to be a mining engineer." To this we may add that Mr. Rickard has the good fortune to be a mining engineer with a mind cultivated by experience, wide reading and sympathetic observation. He is, moreover, a master of the English language.

As befits a sound and honest observer, Mr. Rickard clothes his thoughts in simple, straightforward words. He is no stylist. His sentences are clean-cut. His paragraphs are well constructed. His diction is simple.

Two hundred and fifty pages of the volume are taken up with the record of a journey from New York to Mexico, together with a description of the mining industry of El Oro, Pachuca and Guanajuato. The Spanish Conquest, Vein Formation, Tube Mills, Meteorites, Cortez, the Great Shafts of the Veta Madre, How to Sample, are a few of the diversified topics touched upon and woven into a charming and coherent whole.

The non-technical reader can follow the whole narrative and carry away a clear impression of Mexican mining. The mining engineer can read it with the same amount of pleasure and a super-added sense of profit; for the mining and milling practice of the districts mentioned above is lucidly and adequately described.

It is this unusual combination of scientific accuracy and truly artistic literary skill that makes Mr. Rickard's writings what they are.

We know of no other volume that will give the reader so vivid and so exact a picture of Mexico.

The second part of the book is an account of a ride over the mountainous mining regions of Southeastern Colorado.

Although, like the preceding narrative, it contains a startling variety of subjects, yet there is no confusion. We find ourselves quite as deeply interested in the secondary enrichment of copper veins as in the assassination of brave Arthur Collins.

For the "peckish" reader the volume is plentifully spiced with anecdotes and varied by excursions into history and the realm of human nature. For the student there is an ample supply of scientific pabulum, served rarely well.

We would that space allowed us to quote extensively from any or all of the chapters. But we must be content with one excerpt.

Descending the mountains on their way to Ouray, Mr. Rickard's party came suddenly into full view of the Uncompahgre valley. A storm had just passed. Mr. Rickard describes the scene: "The storm had swept northward, the sky was still partly overcast with flying cloud, a luminous atmosphere, pure as interplanetary space, filled the canyon depths, and from the west the sunlight pierced the lingering mists with mellow light . . . Across the canyon the terraced slopes descended in parklike gradation, resplendent with their livery of autumn, and above their aspen gold the bastions of blue-gray andesite rose tier after tier in Gothic severity of line until belted with the rising mists." A few pages before these lines occur, we came upon an analysis of anthracite coal. Yet there is continuity and sustained interest in every chapter of the book.

Antimony pigments are being favored by the French and Italian Governments. The advantage is claimed over white lead in being non-poisonous and over zinc paint in being permanent and sun-proof.

Tellurium is a practically useless metal. At little is used in medicine, but it is stated that a day's yield of a single copper refinery would stock a large chemical supply house for a year's trade.

Uranyl molybdate, the remarkable new radioactive substance of Andre Lancien, a French student of pharmacy, is prepared by adding ammonium molybdate to uranyl nitrate, when a white amorphous powder separates. This powder is collected and dried in the dark. It is claimed to be as powerfully radioactive as radium bromide, and to have substantially the same effects, while its cost—though high, at $110 an ounce—is low compared with the radium salt at thousands of dollars an ounce.

TRAGEDY IN DIAMONDS.

ALEXANDER GRAY.

The casual reader of daily papers has doubtless dismissed as unimportant the brief cable to the effect that the police of Paris are seeking a humbug named Le Moyne, who fleeced Julius Wernher out of a third of a million dollars. Not knowing the ramifications of the victim of this swindle, the laity not recognizing in the name the chief of Messrs. Wernher, Beit & Company, probably the greatest mining firm in London, the mere fact that a glib-tongued sleight of hand magician had dexterously substituted a genuine diamond for something or other alleged to be of manufactured excellence equaling the real, has been dismissed without other than casual consideration.

Since the principal who parted with 1,600,000 francs is Sir Julius Wernher, Bart., a director of De Beers Consolidated, chairman of Fraser & Chalmers, Limited, the central figure of Witwatersrand mining, and one of the very best types of mining magnates, the incident becomes doubly interesting, in that it rather confirms the expectation among savants that diamonds will, sooner or later, be manufactured economically, perfectly, in quantities and qualities. Not only is Sir Julius Wernher a leading personality; he is a chief factor in the diamond trade, and to his firm is allotted almost 40 per cent. of the profits accruing to the diamond syndicate regulating the output of South African diamonds. How he was bamboozled by Le Moyne may not be revealed, although the publicity given the transaction evidences the determination of Sir Julius to expose the alleged necromancer; but the anxiety of so well informed a mining master to be a party to even the faked discovery will be consolatory to those who were "gold bricked" by Highland Mary promoters, to these who are finding out that tarradiddling is not confined to Ontario flotations.

With Sir Julius the incentive to protect his market is self-evident, more especially in view of the precarious state of the diamond trade. De Beers mines are working half time when they could put out in a twelve-month diamonds valued at $40,000,000 to $50,000,000. The Diamond Syndicate has refused to sell rough diamonds, that is uncut stones, for two months, to enable dealers to get rid of what they have in stock. Banks will not advance as freely against precious stones as security, a security, by the way, which has been safe as gilt-edged paper. Importations to America in December fell off to the extent of $4,000,000, as compared with the same month in 1906. Diamonds carried by dealers mount into the millions. The purchasing power of the public being distrait, impairment of capital is a distressing item in households, and to those in the trade. America has been the best of the De Beers clients, but it took $11,860,443 less in diamonds in 1907 than it did the year previous. If Le Moyne had convinced Sir Julius Wernher and his colleagues that he could chemically create diamonds, the New York panic would be a trivial affair in comparison to what would happen in the jewellery trade. As it is, De Beers shares are selling at half their price of a year ago, and strenuous efforts are being made to maintain the market value of the stone. The output of the Premier mine is bringing about 50 per cent. of what it was valued at two years ago by the chairman of that phenomenal company. Roberts Victor mine shares are 700 per cent. lower than they were. To have Le Moyne appear with a lustrous stone, apparently produced in his laboratory, in view of all this, was justification for Sir Julius advancing a tidy amount on account. When Sir Julius asked for a further demonstration, Le Moyne is said to have betaken himself to less troublesome quarters.

It was explained in THE CANADIAN MINING JOURNAL a while back that the De Beers Mines have a century's supply of diamonds awaiting extraction. The Premier Company have extraordinary possibilities as an individual proposition. Should Parisian chemists achieve with the diamond what they have with chemically produced sapphires and rubies, gems now ranging from $100 to $1,000 per carat, would be as plentiful as beads. The element of rarity and purity present in the diamond when attained—if attained—is what induced Sir Julius Wernher to take the risk in the belief he had found the pot of gold at the end of the rainbow.

The diamond is serene. Sir Julius may not be—but it might have been worse—for De Beers shareholders and the Nouveaux riches.

EXCHANGES.

The *Engineering and Mining Journal*, January 18th.—A special correspondent describes in this number of our contemporary "Slate Mining in Wales and Cause of its Decline." Decrease of building activity, foreign tariffs, and the keen competition of French producers have combined to paralyze the English slate mining industry. The great Penrhyn strike, which removed a monthly output of 10,000 tons from the market caused other Welsh producers to put up prices. A reaction set in and consumers began to look abroad for supplies. French slates, from the district of Angers on the Loire, found favor and have kept hold of the market.

The slate-producing districts of Wales are "bleak, chilly and damp places to live in."

The same is true of the Cornwall districts.

The new law making English employers responsible for all accidents and illnesses contracted by employees in the course of their duties has brought about intolerable conditions in the slate mines.

The slate mining of Wales is centred at the Penrhyn and Dinorwic quarries, where the work is open cut, and at Festiniog, where most of the slate is won from underground. There are also many smaller quarries, either worked on a small scale or abandoned.

The Oakley mine is by far the most important of the Festiniog group. The management is modern and progressive and the equipment is excellent. The yard is situated in the town of Blaenau Festiniog and is about 900 feet above sea level. The mine buildings and dressing houses are at the top of an incline 500 feet higher. The slate veins dip to the north at about 30 degrees from the horizontal. They are worked entirely in underground chambers, in a series of horizontal floors about 60 feet apart.

On each floor there are a number of chambers from 50 to 70 feet wide, separated by walls about 40 feet wide left in the slate. The chambers from one floor to another are usually continuous. The various chambers and

floors are connected by tunnels through the walls and by means of adits and tunnels outside. There are altogether 26 floors. The vertical depth between the top and bottom is 1,430 feet. There are five veins running from a minimum of 30 feet in thickness to 300 feet. They are all worked. The normal output is 4,000 tons of slates per month. About 1,600 men are employed.

The plant for hauling and pumping is modern. Electrical power is used. Current is obtained from a water power generated from the waters of a lake on the side of Snowdon. It is brought eight miles over the hills at 10,000 volts.

The manufacture of slates and slabs is as usual. Suitable pieces are sent to the slab-house, where they are sawn to shape and planed smooth. Everything except the splitting is done by machinery driven by electric motors.

Mining Science, January 16th.—Under the title "The Wisconsin Mining Trade School," R. B. Brinsmade outlines the courses and aim of a new institution at Platteville. The Wisconsin State Legislature is opening the doors of a new institution for secondary mining education. The minimum age limit is set at 15 1-2 years, and the course is only 2 years. The entrance requirements are mainly a knowledge of arithmetic and the use of the English language. Tuition is free and by a co-operative arrangement board and lodging may be obtained at the rate of $3 per week. The expenses of laboratory materials and books are kept low. It is possible for a student to get through a school year on an outloy of $170. Recognizing that mining is not only an art, but a science also, the marked traits of practical self-trained engineers, "curiosity, clear-sightedness, and ingenuity," will be cultivated in students. In addition they will be given an efficient knowledge of mathematics and of the formulated laws of natural science. The course of instruction will be a just compromise between the formal scholastic training and the practical "shop" apprenticeship. "The attempt will be made not to develop consulting engineers, but rather the executive man of action in a scientific occupation."

The subjects taught will include algebra, geometry and trigonometry; chemistry, physics, mineralogy and geology; shop work, drafting, surveying, mining machinery and metal—and coal—mining. The two years' course will cover 80 weeks and there will be extra summer work. The school year will begin in January in order to include two summers. Two months each summer will be spent in underground work—one summer in metal mining and one in coal mining.

No mining theory will be taught the students until after the first summer's underground experience. A shaft will be started on the school campus, as a large body of zinc ore has been proved to exist there.

Laboratory instructing will be given in drilling.

Trans. of the Mining Institute of Scotland, Vol. xxx., Part I.—This pamphlet contains an abstract by James Bain of the report on Rescue Apparatus of a committee appointed by the Fife and Clackmannan Coal-owners' Association. That committee adopted the following conclusions: (1) That a central station equipped with a certain number of sets (say, twenty) of apparatus ready for use in case of emergency, is necessary for Fife, and that it should be in telephonic communication with every colliery. (2) That a certain number of sets of apparatus (say, not less than five) should be kept ready at every colliery. (3) That at every colliery at least twenty men, including all the officials who know the mine, should be instructed in the construction and use of the apparatus. (4) That an intelligent man should have care of the central station, and be capable of instructing the men in the use of the apparatus and keeping the apparatus in order. (5) That the apparatus designed by Mr. Garforth is the best suited for our mines, being lighter, smaller, and more flexible than any other inspected by the committee.

Developing each recommendation further, the committee estimates the cost of a central station, and experimental gallery, to be about £1,200, exclusive of apparatus, and that it would take from £250 to £300 per annum for upkeep. Each rescue party should consist of five persons, one to have charge of the other four, whose only duty would be to direct the operations. The committee further dwells upon a serious defect in all apparatus. Not one type provides for means of communication between the men forming the rescue party, except by signals.

PERSONAL AND GENERAL

Mr. Eugene Coste has returned from a visit to Ottawa and Montreal.

Mr. H. E. T. Haultain left Toronto on the 20th January for Craigmont.

Mr. J. J. Harpell has returned from a visit to Montreal, Ottawa and Kingston.

Mr. R. Anson-Cartwright has returned to Toronto after visiting Great Britain.

The Deputy Minister of Mines for Nova Scotia, Mr. Hiram Donkin, has been appointed Commissioner of Roads for the Province.

The task of presenting the petition for an extension of the bounty upon lead has been entrusted to Messrs. J. L. Retallack and L. Pratt.

Mr. S. H. Reynolds, C.E., assistant city engineer of Winnipeg, will remove to Victoria, B.C., and devote himself to mining engineering.

Mr. Howells Frechette, late of the Crow's Nest Pass Coal Company, passed through Toronto on the 20th of January on his way to Ottawa.

Mr. W. A. Carlyle, recently of the Rio Tinto, and now consulting engineer to Le Roi, passed through Toronto on his way to British Columbia on January 24th.

Mr. J. H. Plummer, president of the Dominion Iron and Steel Company, sailed recently from New York for England. He will be absent for about six months.

Mr. E. A. C. Pew, a prominent railroad and mining promoter, died in Toronto on January 16th, aged 73 years. He was largely interested in the iron mining industry.

Mr. E. J. Laschinger, M.E., B.A.Sc., formerly of Toronto, read a paper on the "Flow of Compressed Air in Pipes" before the Transvaal Institute of Mechanical Engineers, Johannesburg, on December 14th.

Mr. Anthony Blum, president of the Laurentian gold mine, Manitou Lake district, Ontario, visited the property recently, returning with a gold brick valued at about $6,000, the results of a month's clean-up. The name of the company has been changed to the Imperial.

Mr. H. Mortimer-Lamb, Secretary of the Canadian Mining Institute, visited Toronto early in January. Mr. Lamb has had several interviews with the Provincial and Federal Governments recently concerning the expected summer visit of the British Iron and Steel Institute.

Mr. R. H. Stewart, manager of the mines of the Consolidated Mining & Smelting Company, was married on December 26th to Miss A. A. Will, of Toronto. Mr. Stewart is a graduate of McGill, Mrs. Stewart a graduate of Victoria. The wedding took place in Victoria Chapel.

On Wednesday, January 15th, a Western Branch of the Canadian Mining Institute was organized in Nelson, B.C. Mr. Frederick Keffer, of Greenwood, who is president of the parent society, occupied the chair, and Mr. A. H. Gracey, of the Eva mine, acted as secretary. In all twenty-four members were present. There were also present others who will be added to the membership in due course. After Mr. Keffer had briefly outlined the objects of the new branch, a formal motion was made by Mr. S. S. Fowler, seconded by Mr. C. P. Hill, that "we now constitute ourselves a Western branch of the Canadian Mining Institute." This was carried unanimously. The following officers were then elected:—President, Mr. A. B. Hodges; secretary, Mr. E. Jacobs; executive council, Messrs. P. S. Couldrey, R. H. Stewart, L. Hill, O. E. S. Whiteside, W. M. Brewer, J. C. Haas, E. C. Musgrave, J. McEvoy and S. G. Blaylock.

President Hodges in his opening address stated that the whole reason for the formation of the Western branch is that the busy members of the West cannot attend the meetings of the Institute held in the East. He recommended that a committee of three be appointed to look into the by-laws of the Canadian Mining Institute. Accordingly, Messrs.S. S. Fowler, L. Hill and J. C. Haas were appointed and instructed to report on the morrow. Mr. E. Jacobs, editor of the "B. C. Mining Record," thanked the members for electing him to the position of secretary. He added that the Western branch had now almost 150 members, and that it would shortly attain a membership of 200.

Mr. Jacobs then remarked: "In view of the fact that the Department of Mines is now organized, it would be politic for us to draft a resolution congratulating the Dominion Government upon its establishment and expressing appreciation of the useful work done in the West by the Geological Survey and, as well, with reference to the statistics gathered by R. R. Hedley throughout the province." Mr. Jacobs also called attention to the fact that it had been said that the Canadian mint could not use Canadian metal for its work, inasmuch as there was no refinery for certain metals within the Dominion. This was not the case, inasmuch as there was such a refinery at Trail. This matter should be taken up by the Institute.

The secretary was instructed to prepare a resolution along these line.

The meeting then adjourned.

Mr. S. S. Fowler, on behalf of the Nelson members, tendered an invitation to the members to be present at a dance in the Hume Hotel.

Mr. Frank B. Smith has been commissioned as Inspector of Mines for the Dominion to look after the royalties on coal lands sold in Saskatchewan and Alberta.

CORRESPONDENCE.

WESTERN BRANCH OF THE CANADIAN MINING INSTITUTE.

Victoria, B.C.,

The Editor, January 18th, 1908.

Canadian Mining Journal.

Dear Sir,—Accompanying this I send you an account of the first meeting of members of this branch of the Canadian Mining Institute. Although the attendance was not as large as had been hoped for, it was considered good by those who made the arrangements for the meeting, having been representative of the chief lode—and coal—mining sections of British Columbia to a degree regarded as satisfactory, especially when it was taken into account the long distances most members reside from a convenient central point, and the difficulty busy officials usually experience in leaving their posts for four or five days at a time. Interest in the proceedings was general among members present, and was well maintained throughout the several sessions held. It is known that one immediate result was the nomination for membership in the Institute of at least a dozen other men actively associated with mining or smelting in the Northwest, while there was expressed by the leading members of the branch a determination to increase the total number of Western members of the Institute—now about 125—to fully 200 within a few months. With so comparatively numerous a membership, and the fact that it is both influential and representative, together with the active following up of the movement so successfully inaugurated at Nelson on the 15th inst., there does not seem to be room for doubt that eventually this auxiliary organization, launched under distinctly auspicious circumstances, will prove materially beneficial to the mining and smelting industries of Western Canada, and, it is hoped, in some measure also of those of adjacent parts. Your valuable co-operation is therefore earnestly invited.

Thanking you in advance, I am

Yours very truly,

E. Jacobs,

Secretary of Western Branch

One of the unnecessary burdens under which English companies, operating Canadian mines, have almost always suffered is that of costly administration. In the annual report of Le Roi Mining Company, Limited, we notice that a clerical staff is maintained in London, Eng., at an annual cost of $10,000. This is a wasteful duplication. Almost all necessary clerical work can be and should be done at the mine. The company's affairs in England might easily be handled at one-quarter of this outlay.

SPECIAL CORRESPONDENCE

ONTARIO.

COBALT.

Rochester, Cobalt.—Active work on this property will be resumed at once.

Provincial.—Twenty-five men are employed. A station is being cut at the 125 foot level.

Badger.—There are two shifts working here with three drills. Sinking on the No. 2 vein is being carried on.

Amalgamated Cobalt.—Work has been resumed on the lot of this company, adjoining the Trethewey on the west.

Nova Scotia.—Fifty-five men are employed. A car of very high grade ore has been shipped this month. No 2 shaft is now down 110 feet.

Cobalt Merchants' Mining & Milling Company.—At the annual meeting held in Toronto on Saturday, 18th inst., it was decided to wind up the affairs of the company.

Silver Queen.—There are nearly four cars of high grade ore ready for shipment. Work is still going on with the diamond drill. Twenty-five men are employed.

Cobalt Lake.—The big niccolite vein which was cut at 87 feet is now showing good silver values. At the surface this vein was practically solid niccolite, at 87 feet it is cobalt, niccolite and silver.

Northland Mine, Rib Lake (Harris Mine).—Forty men are at work here, and about two cars of ore per day are being shipped. Sinking will be resumed as soon as the new twelve drill compressor is installed.

Temiskaming & Hudson Bay.—The last two cars of ore from here were shipped to Copper Cliff. They brought $70,000, or an average of about $1,000 per ton. The cross cut being run north to the big cobalt vein has cut two small seams of smaltite. The cut is now in 125 feet.

Hudson Bay Extended.—On Saturday, 18th January, it was decided at the shareholders' meeting of this company to exchange the outstanding stock for that in the Cleveland Cobalt, on a basis of one share of H. B. Extended for six shares of Cleveland Cobalt. This will entail an exchange of 300,000 shares in the Cleveland Cobalt.

City of Cobalt.—The shaft on the City of Cobalt Mine is now down 145 feet. The vein, which was one and a half inches wide at the surface, was two and a half inches at 60 feet, and is now from 4 to 5 inches wide at the bottom of the shaft and averages 3,500 to 4,000 ounces silver to the ton. In sinking the 61 feet from the 80 foot level to the bottom 23,000 pounds of No. 1 selected ore, 33,000 pounds of cobbings and 70,000 pounds of screenings were produced. The No. 1 averages 3,500 ounces of silver to the ton, the cobbings 550 ounces, and the screenings over 275 ounces. It is estimated that close to 60,000 ounces of silver have been produced in 61 feet of sinking.

Cobalt Central.—The concentrating mill here is giving very satisfactory results. The mill report for one day in January shows: Tonnage crushed, 50 tons; mill heads, 71.1 ounces; mill tails, 4.6 ounces; extraction, 83.6 per cent.; jig concentrates produced, 315 pounds; table concentrates produced, 291 pounds; ounces silver recovered, 3,355; market value, $1,845.25. The mill is recovering 93 per cent. of the metal values.

The order constituting the Townships of Coleman, Bucke, Lorrain and Hudson "complete inspection areas" has been repealed so far as Coleman is concerned by Order-in-Council. The effect is that Section 68, Mines Act, 1906, no longer applies to Coleman Township, and inspection of claims is no longer required to obtain patents. Sixty days after recording, a certificate of record is issued, and after the work is done a patent is issued, (Section 160 (3) Mines Act, 1906). A licensee who has staked out a claim under the provisions of this Act shall, during each of the three years following the expiration of the three months from the record by or on behalf of such licensee of the staking thereof, perform thereon work, as in the first sub-section hereof, provided as follows:—

(a) During each of the first and second of such three years to the extent of not less than eight hours per day for sixty days.

(b) During the third of such three years' work thereon to the extent of not less than eight hours per day for ninety days.

The shipments from the Cobalt camp for the week ending January 11th were the largest so far for any one week in the history of the camp.

	Lbs.
Coniagas	77,020
Nipissing	131,730
La Rose	85,400
Nova Scotia	40,790

There were 39 companies organized in the eighteen months ending January 1, 1908, with a capital of $38,740,000, to do business in the Northern Ontario mining field.

COPPER CLIFF.

At both the Creighton and Crean Hill mines of the Canadian Copper Company new rock houses are being built. Each rock house has a capacity of 1,500 tons per day. The old rock house at the Creighton has been remodelled and rebuilt. At both mines new electric hoists have been installed, along with electric driven air compressors and pumps. The new engine houses, warehouses and shop buildings are all of fireproof construction.

During the past year an average of 1,000 tons of ore was mined. At the smelter three furnaces were operated all the year except during December, when only two were in blast. Two new furnaces have been purchased and delivered. They will be erected next summer. During the past year a new ten-stand converting plant of the best and most modern type was erected. A new six-stall round house has been added to the plant, and the foundations of new warehouses and shops have been started.

ALBERTA.

FRANK.

The Lille and Bellevue mines are also suffering from bad trade, about 250 miners being affected at these mines.

The Hillcrest mines at Hillcrest, near Frank, are in operation as they have a contract with the C. P. R. for the total output of the mines, and have an arrangement whereby they are allowed to dump the coal on the railway company dump if cars cannot be had. The International Coal & Coke Company of Coleman have a contract with the C. P. R. for a large part of the output and this company's mines are running full time.

Owing to the contract between the Canadian Pacific Railway Company and the Canadian-American Coal & Coke Company of Frank having run out about 250 men are out of employment. Mr. S. Moore, the general manager of the Canadian-American Coal & Coke Company, has asked an advance in price from the C. P. R., and the latter company decline to renew their contract for 800 tons per day unless at the old price. The C. P. R. claim that they are blocked up with coal in all their dumps.

TABER.

The mines round Taber are working very short time, owing to dullness in the coal trade. This has been anexceedingly mild winter, and as the Taber coal is only used for domestic purposes, the demand has not come up to expectations.

The following advertisement appeared in a recent issue of the Fernie *Ledger*:—

"WANTED."

"Employment for 938 miners, mine laborers, drivers, timbermen, hoistmen and engineers, now idle, warranted to be first-class wage slaves.

"Apply F. H. Sherman, Pres. U. M. W. of A., Box 145, Taber, Alta."

F. H. Sherman, president of District 18, United Mineworkers of America, has been in the Edmonton district during the past week settling some labor troubles at the mines. He has now gone to Indianapolis to attend the general convention of the United Mineworkers of America which is being held. The chief item of interest at the convention is the election of a new president to succeed John Mitchell, who has been in poor health for some time past.

It is generally understood that T. H. Lewis will be the member selected to fill the office of president on the retirement of John Mitchell.

EDMONTON.

As a result of a conference between representatives of the miners and mine owners of the Edmonton district a new wage scale has been agreed upon. The new scale was drawn up after a lengthy conference between T. B. Smith, representing the mine ownrs, and F. H. Sherman, of Taber, president of Dist. 18 U. M. W. of A. Dr. McNabb, of Lethbridge, representing the Lethbridge district, E. A. James, of Edmonton, local organizer of the northern district, and Chas. Richardson, president of the local union, all of whom represented the miners.

BRITISH COLUMBIA.

THE KOOTENAYS.

Work at the Granby mines and smelter in the Boundary district is now well under way. At the first of the year but two of the entire battery of eight furnaces at the smelter were operating, and only 250 of the regular force of about 550 men had been put to work at the mines. The output has been gradually increased, and more men put back to work until at this writing nearly 450 men are working at the mines and six of the big furnaces are treating ore. During the week ended January 11th the Granby shipped 12,887 tons of ore and treated at the smelter 15,695 tons. These figures should be much higher for the present week, as the output is being steadily increased. It is the intention of the management to increase the force until the smelter is running at its full capacity of 3,500 tons of ore per day, which will of course necessitate the mines turning out the greater part of this. If it is possible to keep this output up well into the middle of the summer and the affairs of the company look propitious, they will increase the capacity of the smelting plant to a treating capacity of 4,500 tons per day; at least, that is the intention now. The Granby Company's freight bill with the C. P. R. and G. N. R. when running at full capacity, amounts to about $30,000 per month. The British Columbia Copper Company pays the C. P. R. about $10,000 per month.

The British Columbia Copper, Snowshoe or Dominion Copper Company's mines have not made a move to resume work as yet, but it is expected that the coming month will see some developments at those properties. The Dominion Copper Company will hold their annual meeting at Phoenix on the 27th inst., when it is expected that something definite will be done.

With copper selling at its present low price, the Boundary mining companies will have to exercise great economy and good management if the shareholders are to get any dividends. During their last fiscal year it cost the Granby Company 10.13 cents to mine, smelt, refine and sell its copper. British Columbia Copper Company figures ran 12 cents to 12 1-2 cents as cost of mining, smelting, refining and selling its copper product. Dominion Copper Company produced copper at around 10 1-2 cents per pound, f.o.b. its smelter, but during the year ended July 31st last, owing to many drawbacks, it cost them approximately 14 cents.

The labor situation in the Boundary is in a fairly settled condition. There are a number of the men going around with a chip on their shoulder and grumbling at anything and everything, but the majority are not paying much attention to them and are glad to be back at work and doing their little share to tide matters over the present situation by working at a slightly lowered wage. There are two or three men for every position though, having hurried from all points of the compass when they heard that work was to be started up in the Boundary.

The Rossland mines are working a good force of men and good and busy. The Centre Star is shipping 3,700 to 3,800 tons of ore per week, Le Roi from 1,700 to 2,000 tons, Le Roi 2, Limited, about 600 tons.

The Le Roi 2, Limited, Company intends to mine and ship on a larger scale next summer. Considerable development work has been done lately looking towards this, and the showings seem to warrant the expenditure which will be necessary. The Le Roi 2 has always been a money-maker and dividend-payer, and interested people here will be pleased to see that they are planning for operation on a greater scale.

The Rossland Board of Trade is taking a keen interest in the extension of the lead bounty for another five years, and the raising of the limit when the bounty should be paid from $16 to $18. It is noted that the two and a half millions appropriated by the Government for the lead bounty, at the rate of $50,000 per year, only $616,976.02 has been paid to the lead producers. Still, there is no doubt that this bounty has been a wonderful stimulus to the silver-lead mines. This can be easily seen by the increased activity among the smaller silver-lead producers in the Slocan and East Kootenay during the period of its existence. Many of these lesser properties have been worked, developed and have made small shipments that would probably have lain idle had it not been for the bounty.

Residents of this locality take more or less pride from the fact that we are in a position to furnish the new Canadian mint with fine silver and gold for coinage purposes. The Consolidated smelter and refinery at Trail is one of the most up-to-date and complete plants in the country and is in a position to furnish more fine gold and silver than the mint can at present use. The material in the new coins will therefore be mined, smelted, refined and coined in Canada.

Many holders of stock in the East will be pleased to learn that they have made a valuable strike in the shaft at the 500 foot level of the Stemwinder mine. This makes the proposition look a whole lot better. Plans for energetic development work in the future are now being laid out.

The Diamond Vale Coal Company in Nicola valley have finally struck a six foot seam of coal on their property. As near as can be ascertained from the workings in the Valley Coal & Coke Company a very rich seam of fine coal exists 120 feet below the one struck. It is the intention of the Diamond Vale people to sink to this rich seam.

It is expected that the plant of the Nelson Electric Smelting Company for the handling of zinc ore will be in operation in the latter part of March or early in April. The Hewitt Mining Company in the Slocan are working actively and have drawn up plans

for another tramway, which will enable them to handle the product of the mine more economically.

Mr. M. S. Davys, of Nelson, and others, are negotiating for a lease on the Silver King mine at Nelson. The deal has not been put through yet.

The Vancouver mine, controlled by Le Roi 2, Limited, Rossland, and the Eureka (Consolidated) are working right along and are improving with every round fired.

The operators of the Krao mine find it a very expensive proposition to work their property with the present workings on account of the water they have to contend with. A 4,000 foot tunnel is planned, something similar to that driven a while ago by the Rambler-Cariboo, to overcome this difficulty.

A strike of good steel galena has been made on the Aurora property opposite Moyie. This property is supposed to be on the St. Eugene lead, as well as the submarine workings of the Cambrian people, in the centre of Moyie Lake. It does seem that where there is such a magnificent showing as the St. Eugene has there should be other valuable mines.

The Perry Creek Hydraulic mine near Cranbrook has been sold to the Illinois Steel Company of Chicago for $900,000, the original owners retaining $100,000 interest in the mine.

Mr. D. C. Corbin, the Spokane capitalist, who controls nearly 10,000 acres of coal lands on the Crow's Nest, is putting plans into operation to tap them with a railway and work the measures. This will give the Crow's Nest district another producing coal property.

The coal mines of the Crow's Nest, International and Royal Companies are being operated daily. The properties of the Canadian-American Coal & Coke Company at Frank and those of the West Canadian Collieries at Lille have suspended work temporarily.

GENERAL MINING NEWS

NOVA SCOTIA.

HALIFAX.—The Hon. Robert Drummond, editor of the *Maritime Mining Record,* writes strongly on the decision of the Supreme Court of Nova Scotia in the Coal-Steel case. The vital clause 3 is taken as the text for a remarkably frank editorial, in which Mr. Drummond states that the specifications were here incorporated by the Coal Company for the express purpose of preventing the Steel Company from securing coal at $1.28 for any other than the direct needs of manufacturing iron and steel. The decision of the court is traversed point by point. Strong allusion is made to the fact that for every ton of cheap coal obtained by the Steel Company, the public must suffer by paying an enhanced price for domestic coal.

SPRINGHILL.—Manager Cowans of the Cumberland Coal & Railway Company, Springhill, has refused to meet the Conciliation Board or the representatives of the workmen. Mr. Cowans claims that there is nothing to arbitrate. However, the Board is meeting and has taken evidence in the "stone" question.

ANTIGONISH.—Hugh Fletcher, of the Geological Survey of Canada, is investigating the recently discovered coal deposits at Big Marsh. Diamond drills are being used. Deputy Inspector of Mines Blackwood is associated with Mr. Fletcher.

WESTVILLE.—The fire clay and firebrick plant of the Drummond Colliery had a prosperous year in 1907. Their market is largely in Sydney and Sydney Mines with the two steel companies. For ladle linings their product is unsurpassed.

The Drummond colliery exceeded all previous annual records.

SYDNEY.—The Dominion Iron & Steel Company is reported to have struck a large seam of coal on the Cowan's areas. Thirty men are working on these areas.

ONTARIO.

OTTAWA.—The Railway Committee of the House of Commons discussed the building of a branch of the British Yukon Railway Company to the valuable copper deposits of the Takhiena River district. The branch is to be commenced within two years and completed within five years of the passing of an Act authorizing the company to build it. It will be 25 miles in length.

TORONTO.—The shareholders of Peterson Lake at a special meeting held on January 22nd refused to approve the proposal of the directors to sell thirty acres of their property to the Nova Scotia Cobalt Mining Company for 150,000 fully paid shares in the latter company. The proposal to elase ten acres on the west side of the lake to the Little Nipissing Mining Company was unanimously adopted. The Little Nipissing people thus secure ten acres for five years on condition that they do all the development and pay the Peterson Lake Company 25 per cent. of the receipts from ore sales.

Frank Law was fined $200 on Monday, January 21st, by Magistrate Kingsford. The charge laid was that Law as president of Law & Company, and as an officer of the notorious Highland Mary Mining Company, Limited, had committed a breach of the Companies' Act in issuing false prospectuses.

COBALT.—In the Foster mine vein No. 8 has been struck at the 140 foot level. Good results were obtained from this vein on the 70 foot level.

During 1907 Nipissing shipped a total of 2,406 tons of ore, valued at $1,375,000 gorss. Ore blocked out, ready for mining, on January 1st, 1908, has an estimated gross value of $1,057,000.

Silver nuggets totalling more than one hundred pounds in weight were stolen on January 21st from the King Edward mine. It is reported that a reward of $1,000 is offered for information leading to the apprehension of the thieves.

PORT ARTHUR.—J. S. Steele, manager of the St. Anthony's Reef gold mine, on January 20th deposited in the vaults of the Port Arthur branch of the Bank of Montreal several gold bricks. These were the result of a clean-up at the St. Anthony mill. Firty-five miners are employed at the mine and the mill is running regularly.

Major J. K. Harley, of London, Eng., is reported to have organized a company for the purchase of a large block of iron ore areas at Loon Lake and Beck Siding.

COBALT.—The shipments of ore from the Cobalt camp for the week ending January 4th amounted to 204,420 pounds, as follows:—

La Rose	104,910
Nipissing	54,410
Townsite	45,100

SAULT STE. MARIE.—The "Soo" steel plant is closed, the blast furnaces will be kept in operation.

ALBERTA.

EDMONTON.—As a result of friction between the C. P. R. and the operators the Frank, Bellevue and Hillcrest coal mines are closed, together with a number of smaller mines. About 1,100 miners are out of work. Low prices are the cause of the trouble.

BRITISH COLUMBIA.

GOLDEN.—A small experimental mill has been erected near Golden for working the Elmore Vacuum Oil Process of ore concentration. The mill has a capacity of 40 tons per day. Five years ago the old Elmore process was tried without success at Le Roi No. 2 and White Bear.

NELSON.—The power and milling equipment of the Blue Bell mine, on Kootenay Lake, is now complete. A 200 ton mill has been built and water has been flumed for several miles. The mine is a lead and zinc producer. Upon the completion of the new zinc reduction plant at Nelson, shipments will be made there by the Blue Bell.

The old Hall Creek Placer Mine, 10 miles south of Nelson, on the Spokane Falls and Northern Railway, is to be reopened on a large scale. The gravel has given 20 to 26 cents per cubic yard. For the last ten years Chinamen have worked the ground.

PHOENIX.—For the week ending January 11th the Granby Company's mines were the only shippers from the Boundary district. These mines shipped 12,887 tons of ore and treated 15,695 tons at the smelter. It is hoped that 20,000 tons will be shipped during the ensuing week.

The enlargement of the lead plant of the Consolidated Mining & Smelting Company will make the further shipment of lead concentrates to Europe unnecessary.

The Nicola Valley Coal & Coke Company shipped 3,593 tons of coal during December. The company employ 130 men.

The Vancouver and Hewitt mines of Silverton shipped eight car loads of ore during the week ending January 11th.

The Granby mines and smelter are in normal working condition. Six furnaces are in blast and 2,500 tons of ore per day are being produced at the mines, where nearly 500 men are employed.

VICTORIA.—The Eastern British Columbia Railway Company is applying for permission to build a railway from Crow's Nest Pass to Eastern Kootenay. If it succeeds it will operate some of its 10,000 acre of coal lands in the last named district.

The Pacific Slate Company of Victoria owns and controls an area of 625 acres of slate-bearing lands. The first shipment from the newly opened quarries arrived recently in Victoria. The quantity shipped was 17,000 square feet. The slate is of superior quality. The property is situated on Jervis Inlet, 80 miles north of Victoria.

SILVERTON.—The week ending January 4th saw the largest shipments ever made from this camp. Eight car loads of ore were shipped to the smelters.

ROSSLAND.—Development has been pushed half way into the Idaho from the fourth level of the Centre Star. On the fifth level the ore body in the Idaho has been cut by a diamond drill hole, and the fifth level is being extended towards the ore. A shaft have been extended down to the fourth level. On the 150 foot level drifts are being extended both ways in good ore. The eleventh level of the Centre Star has been extended into the Idaho, and has resulted in the opening up of an ore body 35 feet wide near the Centre Star end line.

Several stopes on the Centre Star's eleventh level have turned out unexpectedly large. On the thirteenth and fourteenth levels development has been in progress long enough to demonstrate that the vein more than maintains its size at depth, having a width when crosscut on the fourteenth level of 65 feet. Ore stoped from here has run well up to the mine average. Face samples running to a value of $40 to the ton have been obtained. This is at a depth of 1,900 feet.

In the lower levels of the War Eagle individual samples as high as $200 to the ton are not uncommon, and a recent shipment of 100 tons ran $50 per ton in gold alone. This ore is a heavy sulphide. It is worthy of note in this connection that ore from the twelfth level carries copper values considerably above the average.

In the Iron Mask four veins intersect at one point. At the intersection on the fourth level a large ore body is being opened up. The vertical dimensions of the ore are not yet definitely known. One vein that was worthless when the mine was held by former owners, now yields a good profit under present conditions of cheaper mining and treatment costs.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Royal Commission on Mines has appointed a committee consisting of Prof. Redmayne of Birmingham University, A. M. Lamb, mining engineer, and W. Walker, Inspector of Mines, to visit a number of representative collieries and report as to the causes of and means to prevent accidents from falls of rock and side and underground haulage.

A notable feature of the coal trade during 1907 was the continued expansion of the export trade. Final returns are not yet available, but in the eleven months ended with November there had been an increase in export of about 7,500,000 tons over 1906, following an increase for the latter year over 1905 of 8,500,000 tons. Sales to Germany increased by 3,500,000 tons, and increased trade was done with nearly every European country.

A serious strike has broken out at the Nottinghamshire coal pits of Barber, Walker & Company, involving 3,000 employees. The men declined to accept a wage scale based on existing prices.

A discovery of gold-bearing rocks has been made at Henllys near Newport, on the Welsh border. A mining expert obtained permission to have the rocks crushed and assayed and they were found to be rich in gold. Gold exists in many places in the United Kingdom, but usually in minute quantities. There are only four producing mines in existence, and the total value of the gold mined in 20 years is £345,645.

RUSSIA.

Near Hagri, in the Caucasus, an abundant deposit of asphalt has been discovered, and a company formed to work it. A large factory is being built in the Zhockari valley, where asphalt will be prepared both for home consumption and export.

The Kamchatka peninsula is attracting the attention of gold miners. Reef gold has been discovered near Petropavlovsk, where prospecting has proved the occurrence of a quantity of gold at a shallow depth.

AUSTRIA-HUNGARY.

A company has been formed at Prague with a capital of 500,000 crowns to develop the coal fields belonging to Oberfinanzrath Kress at Hotomitz, near Dux, Bohemia.

BULGARIA.

The mining industry is being gradually developed with the aid of foreign capital, a number of British capitalists and mining experts having made exhaustive researches in this field. A British company has obtained a concession for working a copper mine at Belogradchik. Copper is also to be found at Vratza and near the Black Sea port of Bowigas. Concessions have been granted by the government for coal, iron, lead and zinc mines in various localities.

CHINA.

A Chinese company has been organized with a capital of $2,000,000 to open iron and coal mines near Awtow, 55 miles northwest of Tsuantsiu. English engineers have charge of the development work and of the construction of 50 miles of railroad in connection with the mines.

UNITED STATES.

The following figures showing the mineral and metallic production of the United States for 1907 are published by the *Engineering and Mining Journal* as being a close approximation to the actual output, a portion of the returns for December being based on estimates.

Non-metallic.—Coal, bituminous, short tons, 383,480,080; value, $441,949,931; changes in quantity, I. 41,850,957. Coal, anthracite, short tons, 85,063,264; value, $159,942,986; changes in quantity, I. 12,853,698. Garnet, short tons, 6,500; value, $216,125; changes in quantity, I. 1,096. Iron ore, long tons, 52,418,755; value $110,079,385; changes in quantity, I. 3,201,266. Limestone flux, long tones, 14,925,000; value, $10,447,500; changes in quantity, I. 373,000. Petroleum, barrels, 165,788,906; value, $118,408,409; changes in quantity, I. 34,106,401. Phosphate rock, long tons, 1,917,000; value, 13,419,000; changes in quantity, D. 135.742.

Manufactured.—Bromine, pounds, 1,062,000; value, $138,060; changes in quantity, D. 167,000. Coke, short stons, 40,090,670; value, $106,757,970; I. 7,400,308. Copper sulphate, pounds, 40,138,117; value, $2,733,405; changes in quantity, D. 10,787,815. Copperas, short tons, 25,212; value, $262,120; changes in quantity, I. 4,373. Graphite, artificial, pounds, $6,924,000; value, 483,717; changes in quantity, I. 2,056,000. Lead, sublimed white, short tons, 8,700; value, $1,026,600; changes in quantity, I. 712. Zinc oxide, short tons, 83,280; value, $7,516,360; changes in quantity, I. 5,480.

Metallic.—Aluminum, pounds, 25,000,000; value, $11,250,000; changes in quantity, I. 10,650,000. Copper, pounds, 895,104,000; value, $184,937,437; changes in quantity, D. 22,516,000. Gold, oz. fine, 4,335,560; value, 89,616,017; changes in quantity, D. 312,825. Iron, pig, long tons, 25,975,944; value, $892,251,523; changes in quantity, I. 668,753. Lead, short tons, 359,058; value, 38,239,677; changes in quantity, I. 13,529. Quicksilver, flasks, 19,900; value, $805,950; changes in quantity, D. 5,409. Silver, oz. fine, 56,925,911; value, $37,187,990; changes in quantity, I. 742,411. Zinc, short tons, 246,688; value, $29,415,077; changes in quantity, I. 21,194.

The zinc separating plant in operation at the Lexington mine of La France Copper Company, Butte, Montana, is declared to be completely successful and likely to prove of great advantage to the mines in the neighborhood which have on hand quantities of silver-zinc ore. This ore carries silver, gold, copper, lead, iron and zinc, but on account of the predominance of the latter metal the copper smelters have been unable to treat it except at a heavy loss. The new system which has been in operation in Texas for some years saves every metal in the ore.

MEXICO.

Oil in good quantities has been found in three wells drilled by W. R. Hearst and James Keene near Ojinaga in Eastern Chihuahua. One is down 4,000 and another 1,400 feet.

Miners throughout Mexico are being called on to accept reductions in wages of from 25 to 75 cents per day, the reasons assigned being the low price of metals and the increase in the supply of labor caused by the closing down of mines.

VENEZUELA.

President Castro has annulled the contract made by the government with the Venezuelan Salt Monopoly, Limited, an English corporation, signed in 1905, leasing certain salt mines and giving them a monopoly of the sale of salt for ten years.

AUSTRALASIA.

The Queensland Government announce that recent tests of coal from the Government mine on Dawson River have proved satisfactory, the indication being that it is a fuel similar to some of the American anthracites requiring a forced draught for its proper combustion.

A bulletin of the New Zealand Geological Survey gives a description of the large deposit of iron ore situated on the shores of Parapara Inlet, which has so far been left practically untouched. The ore occurs in three enormous blocks, the amount contained in the Washbourn block being estimated at 22,691,762 tons. In 34 samples taken from this block the average iron content was 51.79 per cent. The ore is mainly limonite, though partly gothite and possibly turgite, and phosphorus, sulphur and other impurities do not occur in serious quantities. The deposits are all in accessible localities.

SOUTH AFRICA.

The annual report of the Orange River Colony Mines Department for the year ending June 30th, 1907, states that there was a marked increase in the coal output. The total tonnage produced during the year was 499,590 tons, value £139,674, as against 263,232 tons for the previous year. Keen competition among coal operators in the Transvaal has resulted in price-cutting, which has reached against further development, but prices in the Transvaal have recently been raised by a combine.

Great activity has been shown lately by prospectors for diamonds in Orange River, especially in the neighborhoods of Boshof and Smaldeel. Though the number in the field was unprecedented, the Mines Department report for 1906-97 notes that no discovery of a payable mine was reported, though one or two finds may ultimately prove valuable.

The gold output of the Transvaal for November was 549,801 ounces, valued at £2,335,406, a slight decrease from the production for October.

COMPANY REPORTS.

COBALT TOWNSITE SILVER MINING COMPANY OF CANADA, LIMITED.

The first annual meeting of this company was held on December 30th at Salisbury House, London, E.C. Col. Sir A. C. F. Fitz-George presided. In his report he mentioned that the issued capital of the company is £185,007. One hundred and eighty thousand shares of £1 each are issued fully paid to the Canadian Company. The balance, £5,000, was subscribed in cash at par by the promoters. Five thousand six hundred pounds has been provided by the Canadian promoters in loans for working expenses. The English Company has also advanced £8,240. One hundred and seventeen tons of ore carrying 40,000 ounces of silver have been shipped. The mine is now self-supporting, althouyh funds may be needed if suitable arrangements cannot be made with smelters. The concentrating company, with whom the Townsite has entered into a contract, is expected to begin operations in January. Concentrating ore to the amount of 664 tons carrying about 20 ounces per ton is on the dumps.

Mr. A. J. Young, managing director of the Canadian Company, stated that $75,000 had been spent on the property. He outlined some of the difficulties overcome and spoke hopefully of the future.

LE ROI MINING COMPANY, LIMITED.

Notice of this, the eighth ordinary general meeting, held in London, Eng., on December 23rd, was crowded out of our last issue. Mr. T. D. Grinmke-Drayton, J. P., chairman of the company, presided, and in his address alluded to the fall in price of copper, to the shortage of fuel, and high cost of labor as having been instrumental in reducing profits. The Northport smelter had a continuous run of only four months. The Trail smelter was closed for a considerable time and was unable then to treat the ore contracted for from Le Roi. Wages and cost of all materials have increased during the year. Nevertheless more money was spent upon development work than for several years past. The main shaft has been sunk to the 1,650 foot level and development pushed on to the Black Bear claim, where the expectation of finding ore was realized.

The chairman, continuing, announced that the financial year is to end hereafter on September 30th and not on June 30th. This will give more value to the annual meeting. Referring to Mr. W. A. Carlyle's appointment as consulting engineer, the chairman said that Mr. Carlyle was chosen because a man was wanted who had had experience of the peculiarities of Rossland mines, who was not connected with any companies whose interests would clash with Le Roi's, and whose name and reputation would command the confidence of the shareholders and the public.

The managing director, Mr. A. J. McMillan, referred at length to the difficulties and hindrances by which the management had been hampered during the past year. A falling off in value of the ore at the rate of nearly $2 per ton, making a total loss for the year of about $250,000, made a dividend payment undesirable. However, late vigorous development gave assurance of better ore for the ensuing year. Upon the sinking of the main shaft from the 1,350 to the 1,650 foot level £11,000 was expended. No benefit was derived from this until after June 30th, the end of the financial year. Large shipments made to the Trail smelter under contract, when copper was at a low mark, prevented the company from getting the benefit of the subsequent rise. On June 30th, 1907, the company had in transit and on hand nearly 900,000 pounds of copper, the whole of which was seriously affected by a fall in price. The depreciation amounts to over $34,000. Although profoundly affected by the fall in price of copper, the company was not hurt by the fall in silver and lead.

Mr. McMillan alluded, in closing, to the cheerful prospects held out for the company year. He predicted a rise in price of copper and mentioned that a substantial reduction in wages had been recently accepted by the company's employees. He congratulated the company upon the appointment of Mr. Carlyle.

Discussion elicited the facts that the smelting costs per ton were $10.02 on 131,000 tons of ore, and that there was a reduction at the refinery for losses in dealing with the matter. Mr. G. W. Wilson, a retiring director, was unanimously re-elected to the Board.

It is worthy of note that the company maintains a clerical staff in London at an annual cost of $10,000. This was the subject of some comment.

COMPANY NOTES.

The annual meeting of the Royal Victoria Mining Company was held at Greenwood on January 27th.

It is announced that a dividend of 3 per cent. will be paid on the new Temiskaming stock on February 15th next.

The International Coal & Coke Company, Limited, will, on February 1st, 1908, pay a dividend of two per cent. on its issued and outstanding stock.

The annual meeting of the Dominion Copper Company was held on Monday, January 27th, at the company's registered British Columbia office in Phoenix.

The annual meeting of shareholders in the Silbert Consolidated Mines, called January 22nd, was postponed until February 8th at the King Edward Hotel, Toronto.

Fernie. The Crow's Pass Coal Company paid out in wages on Saturday about $200,000. The Home Bank will distribute the money at Coal Creek, Fernie and Michel.

A check has been received from the O'Brien mine by the Provincial Treasurer for $7,327.75, the 2½ per cent. royalty on the mine output for the month of December.

The Dominion Coal Company has declared a dividend on its preferred shares, payable February 1st, 1908. This is the half yearly dividend of three and one-half per cent.

The Northern Exploration Company, of which Col. A. M. Hay is president, has declared another 10 per cent. dividend, payable January 31st. This makes a total dividend payment of 20 per cent. for the year ending January 31st, 1908.

The financial statement of the Stemwinder Gold & Coal Mining Company, Limited, of British Columbia, shows that the total capital stock now issued amounts to $666,707.75, on which $68,170.56 still remains to be paid. The company's gross available funds are given as $75,301.56. After making certain necessary deductions, there remain $62,450.15 in cash available for work, machinery, etc. For the year the operating expenses amounted to $64,535.39.

In a circular dated January 20th, the Nipissing directors make the following announcement: The following is a brief financial statement of the affairs of the Nipissing Mining Company, Limited (the operating company) as of January 1, 1908:

Cash in bank and bullion on hand	$387,458.00
Ore in transit and at smelters	337,400.00
Ore sacked at mine ready for shipment..	163,542.00
	$888,400.00

At the annual general meeting of the shareholders of the Diamond Vale Coal & Iron Mines, Limited, held on Wednesday, January 15th, a satisfactory report was read. Before the end of the current year it is expected that a daily output of 500 tons will be reached. There is evidence that the entire 2,067 acres held by the company is underlaid with coal. About $50,000 has been spent on development. A complete surface equipment has been installed, and regular shipments of high grade coal have been commenced. The present output is but 25 tons per day in excess of the company's own requirements. Additional working faces will one by one add 20 tons each to the daily output until the maximum capacity is reached.

The annual report of the Northern Securities Company shows that the company during 1907 acquired by subscription 2,067 additional Crow's Nest Pass Coal Company shares. The aggregate holdings of these shares by the Securities Company are valued in the statement at $3,741,122, the increase in this item for the year being $516,750. The company, since its distribution of its former holdings of Northern Pacific and Great Northern shares, holds $2,858,594 of Chicago, Burlington & Quincy shares, and less than a thousand dollars of N. P., G. N. and C., B. & Q. joint bonds. The company received on its Crow's Nest Pass stock $150,841 in dividends. The net dividend income of the Securities Company was $330,000, and, after the payment of the 5 per cent. dividend, the balance of income was applied on the payment of securities acquired during the year.

STATISTICS AND RETURNS.

NOVA SCOTIA COAL SHIPMENTS.

Intercolonial Coal Company—Monthly shipments:—

	1906.	1907.	Changes.
January	24,310	23,734	d 576
February	14,831	18,418	d 3,587
March	25,166	16,820	d 8,346
April	23,123	25,738	i 2,615
May	24,125	24,813	i 688
June	27,988	22,374	d 564
July	24,177	23,919	d 258
August	26,885	25,755	d 1,130
September	19,341	21,003	i 1,162
October	26,518	19,973	d 6,545
November	20,726	29,276	i 8,550
December	23,224	22,565	d 659
Total	280,414	274,388	
		280,414	
Decrease 1907		6,026	

Acadia Coal Company—Monthly Shipments:—

	1906.	1907.	Changes.
January	20,615	26,228	i 5,613
February	17,999	19,261	i 1,262
March	19,299	18,430	d 869
April	18,174	24,289	i 6,115
May	22,460	24,047	i 1,687
June	26,873	30,639	i 3,766
July	19,983	30,080	i 10,097
August	23,952	29,071	i 5,119
September	22,913	28,198	i 5,285
October	27,222	31,987	i 4,765
November	28,976	32,327	i 3,351
December	26,246	27,355	i 1,409
Total	274,712	321,912	
		274,712	
Increase 1907		47,200	

Cumberland Railway & Coal Co.—Monthly Shipments:

	1906.	1907.	Changes.
January	45,816	22,427	d23,389
February	39,358	25,378	d13,981
March	40,151	27,982	d12,169
April	30,980	29,873	d 1,107
May	33,912	36,560	i 2,649
June	33,259	34,310	i 1,051
July	27,706	37,057	i 9,351
August	32,145	.....	
September	29,164	.....	
October	32,212	.....	
November	13,123	28,741	i14,618
December	20,731	34,389	i13,658
Total	379,557	276,717	
		379,557	
Decrease 1907		102,840	

Inverness Railway & Coal Co.—Monthly Shipments:—

	1906.	1907.	Changes.
January	5,827	15,935	i10,108
February	6,740	11,867	i 5,127
March	8,882	10,776	i 1,895
April	10,885	15,352	i 4,467
May	22,124	21,044	d 1,080
June	18,000	28,062	i10,062
July	19,762	27,960	i 8,258
August	25,145	23,153	d 1,992
September	22,765	22,422	d 343
October	27,452	22,275	d 5,177
November	19,142	22,257	i 3,115
December	15,898	21,971	i 6,073
Total	202,562	243,075	
		202,562	
Increase 1907			40,415

Totals.	1906.	1907.	Changes.
Inverness Co.	227,000	283,000	i56,000
Cape Breton Co.	841,000	3,830,000	d11,000
Pictou Co.	593,000	633,000	i40,000
Cumberland Co.	509,000	420,000	d89,000

—From the *Maritime Mining Record.*

BRIITISH COLUMBIA SHIPMENTS.

The shipments for the week ending Saturday, 11th January, were light, but this is entirely due to the Boundary. The shipments from Rossland and from the Slocan are above the average and one or two new properties are to be seen upon the list. The shipments from the Boundary section are merely light because of the inability to start at once so large a property as the Granby running in full swing within a few weeks. Within a few weeks the output should be at least up to normal conditions.

Followings are shipments, up to date for the beginning of the year:—

Boundary Shipments.—Week, 12,887; year, 12,887.

Rossland Shipments.—Week, 6,018; year, 11,572.

Slocan-Kootenay Shipments.—Week, 3,216; year, 5,081.

The total shipments for the past week were 22,121 tons, and for the year to date 29,540 tons.

There was a noticeable increase in the amount of ore shipped to the Granby smelter during the week ending January 18th, although the amount is not as yet up to the normal tonnage of the property. On the other hand, the smelter is treating rather more than the ore received, the total tonnage for the week being 17,238 and for the year 32,953 tons, receipts from the mine during the same period being 29,246 tons.

There are a good many shipments this week from the mines of the district around Ymir, where considerable activity is now noteworthy. The Slocan is also well represented.

Following are the shipments, up to date for the beginning of the year:—

Boundary Shipments.—Weew, 16,359; year, 29,246.

Rossland Shipments.—Week, 5,381; year, 16,953.

Slocan-Kootenay Shipments.—Week, 2,944; year, 7,679.

The total shipments for the past week were 24,684 and for the year to date 53,869 tons.

The production of the British Columbia Copper Company for 1907 amounted to 8,119,502 pounds of copper.

The output of the Crow's Nest Pass Company's collieries for the week ending January 10th was 23,399 tons, or a daily average of 3,900 tons.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending January 17th was 24,641 tons, or a daily average of 4,102 tons. For the corresponding week of last year the output was 17,230 tons, or a daily average of 2,871 tons.

The output of the Crow's Nest Pass collieries for the week ending January 24th was 20,705 tons, a daily average of 3,450 tons.

The general results of the operations of the Le Roi Mining Companyforthe past four years as set out in the subjoining table:—

Year.	Ore shipped. Tons.	Value. Ton.	Costs. Ton.	Profit. Ton.
1904	160,110	$10.94	$10.57	$9.37
1905	114,960	12.41	10.08	2.33
1906	110,042	12.37	10.50	1.87
1907	131,696	10.49	10.02	0.47

Following are the shipments from Cobalt camp for the week ended January 18th:—

	Pounds.
Buffalo	63,000
La Rose	296,000
Nipissing	64,540
O'Brien	120,200
Kerr Lake	39,980
Watts	64,780

The total shipments for the week were 648,590 pounds, or 324 tons.

The total shipments for the year 1907 were 28,010 pounds, or 14,010 tons.

Considering the amount of time lost by miners during the month of December, the output for the different collieries of the Nova Scotia Steel & C oal Company compare favorably with previous months. In all, 11,784 tons were raised, as follows:—

	Tons.
No. 1 colliery	18,560
No. 3 colliery	23,468
No. 5 colliery	6,868
No. 4 colliery	688

The total amount of coal mined from the collieries during the 12 months just ended was 638,065 tons, No. 3 colliery being the

biggest producer, with an output of 296,466 tons; No. 1, with 256,161; No. 5, 82,310 tons, and No. 4, 3,128.

Dominion Coal Company's outputs, 1st January to 15th January, 1908:—

	Tons.
No. 1	19,359
No. 2	26,273
No. 3	13,709
No. 4	19,187
No. 5	22,905
No. 6	9,555
No. 7	3,054
No. 8	5,703
No. 9	13,932
No. 10	4,596
Total	138,273

The copper production of the Granby Consolidated Company for 1907 was 15,514,000 pounds, a falling off of more than 2,000,000 pounds as compared with 1906. Shortage of coal and coke along with labor difficulties were the causes of this decline.

The ore production of the St. Eugene mine at Moyie for 1907 was 152,827 tons. Three hundred and twenty-five men were employed. St. Eugene is the second largest silver-lead mine on the continent. It is owned by the Consolidated Mining & Smelting Company of Canada.

Figures covering the output of gold in Rhodesia, South Africa, for the month of December place the total at 53,113 fine ounces, making the grand aggregate for the year 1907 612,452, a new high record. In November the total was 50,891 fine ounces, and in December a year ago was 48,329 fine ounces.

The following table gives the output of gold, by months, for a series of years:—

	1907. oz.	1906 oz.	1905. oz.
January	47,048	42,950	32,531
February	40,482	38,037	30,131
March	46,887	44,574	34,927
April	49,772	42,423	33,268
May	52,668	46,729	31,332
June	54,918	47,664	35,256
July	54,438	48,485	34,693
August	54,790	50,127	35,765
September	53,622	48,410	35,785
October	53,823	45,664	33,383
November	50,891	48,503	32,861
December	53,113	48,329	37,116
Total	612,452	551,895	407,043

During the year 1907 Nipissing shipped a total of 2,406 tons of ore containing silver of an estimated total gross value to the company of about $1,375,000. It is impossible, as yet, to figure accurately the value of the ore shipments, as a number of cars are still outsstanding.

In addition to the above shipments the Nipissing Company had on hand on December 3 ore of a gross value of $165,500, figuring silver at 53 cents an ounce.

At the beginning of the 1908 year the Nipissing Company had a tonnage of ore in the mine available for extraction of estimated gross value of $1,057,000.

The following is an estimate of the value of the ore shipped in each month of the year 1907:—

Month.	Tons.	Silver oz.	Approx. gross value.
January	271.8	176.603	.....
February	183.4	220,642	.....
March	285.0	91,124	.....
May	231.3	188,144	.....
June	337.2	287,407	.....
July	151.3	153,385	.....
August	420.5	302,324	.....
September	158.9	323,227*	$1,132,858
October	64.7	151,108	.....
November	118.6	32,397	.....
December	183.4	273,778**	242,360
Total	2,406.1	2,200,143	$1,375,218

* At 65c.

** At 53c.

Shipments from the Cobalt camp, December, 1907:—

Mine.	Tons of 2,000 lbs.
Buffalo	132.100
Coniagas	87.70
Drummond	28.55
Kerr Lake	52.75
King Edward	31.12
La Rose	130.22
McKinley-Darragh	561.28
Nancy Helen	30.10
Nipissing	189.37
Nova Scotia	120.00
O'Brien	29.95
Right of Way	62.10
Silver Leaf	24.60
Temiskaming	22.80
Temiskaming & H. B.	32.00
Trethewey	31.00
Total	1265.64

This was shipped as follows:—

Canada, 250.16 tons, or 19.77 per cent.

United States, 1015.48 tons, or 80.23 per cent.

For the first nine months of 1907 the Dominion Government paid in bounties to the iron and steel manufacturers of Canada $1,299,000, of which the Algoma Steel Company obtained $348,000, the Dominion Iron & Steel Company $699,000, the Nova Scotia Steel & Coal Company $93,000, and the Hamilton Steel & Iron Company $125,000. This bounty was paid on pig iron, puddled bars, steel ingots and manufactured steel.

The total bounties paid to manufacturers by the Dominion Government for the past few years are as follows:—

1906	$2,050,000
1905	1,540,000
1904	908,000
1903	1,401,000
1902	791,000
1901	467,000
1900	312,000

A new record was made at the plant of the Dominion Iron & Steel Company on Monday, January 6th, when in twenty-four hours the blast furnaces turned out 1,135 tons of pig iron. This is the best day's work yet done at the works. The previous week a record of 1,027 tons was made.

The production of gold at the Rand in December is officially announced at 583,526 fine ounces, valued at £2,478,659. The preliminary statement, which was sadly out, placed the production last month at 540,000 fine ounces. In December last year the output was 550,167, and in December, 1905, 431,594 fine ounces. The out-turn of gold at the Rand for the calendar year ended December 31st last aggregated 6,551,662 fine ounces, against 5,786,617 fine ounces in 1906, and 4,897,221 fine ounces in 1905.

The first estimate of Canada's gold production in 1907 shows a decrease as compared with 1906. The yield of gold from British Columbia was nearly a million dollars less than in 1906, and there was a further falling off in the Yukon. The placer mines at the end of the year, however, were in such a position as to indicate a larger output. During the current year than in 1907. Together the declines in the British Columbia and Yukon fields in 1907 represented a loss of two and one-half millions. The output in 1906 was $12,023,032. This year's production is $9,500,000, the decline being in exact figures $2,523,032, which is a little less than the decrease in the entire world's production. The output in the United States fell off by nearly six millions, and that of Australia by seven millions. Large gains were made in Africa. Although the T8ransvaal output was enormously increased since the Boer war, it is now receiving a setback. Monthly returns continue to reflect decreases, the output for December being ten thousand ounces below October. The value of the Transvaal December output was $11,475,000, compared with $11,677,000 in November, and $11,684,000 last December.

Crow's Nest Pass Coal Company, Fernie, B.C.—There is a very marked increase in the annual output of the collieries and coke ovens of this company. The total production might have been larger had the management been able to rely upon regular orders from the smelters. As has been mentiond before in these colunms, the increase of wages at the smelters in South Eastern British Columbia disturbed the balance of labor during the summer. The reduction of wages following hard on the heels of the fall in price of copper, was an inevitable consequence of an ill-advised step. Temporarily the higher wages paid at the smelters drew workmen from Fernie and left the Coal Company short handed. Yet the year's output is more than satisfactory.

1906—Coal, 806,901 tons; coke, 213,295 tons.

1907 (approximate—not including December)—Coal, 985,000 tons; Coke, 235,000 tons. Increase over 1906—Coal, 22 per cent.; Coke, 10 per cent.

When returns are complete the coal tonnage will exceed 1,000,000 tons and the coke, 250,000 tons.

The Crow's Nest Pass Coal Company will, during 1908, practically double its output.

INDUSTRIAL NOTES.

From the Christman Company, Massilon, Ohio, we have received a catalogue of their drilling machinery and mine equipment. Features of especial interest are their automatic switch and signal for use in coal mine tipples and at partings in mines, and their hollow rod tools for test drilling. The former device is labor-saving; the latter has one or two valuable improvements. Hollow rod tools are especially adapted for drilling test holes for coal, lead, zinc, placers, water wells, foundations and all work where continuous samples of successive strata are desired.

The Mashek Engineering Company has changed its location. It is now established in larger and better quarters at 141 Broadway, New York. The coal briquetting machinery rendered this change essential.

MARKET NOTES.

Silver.—January 2nd, 54 1-4; January 3rd, 55 1-8; January 4th, 55 5-8; January 6th, 55 7-8; January 7th, 58 3-8; January 8th, 57 1-8; January 9th, 56; January 10th, 54 3-4; January 11th, 55 1-4; January 13th, 56 3-8; January 14th, 55 7-8; January 15th, 55 5-8; January 16th, 56; January 17th, 55 3-8; January 18th, 55 1-2; January 20th, 55 5-8; January 21st, 55 1-2; January 22nd, 55 1-2. Sterling Exchange, January 22nd, $4.8675.

Copper.—January 22nd, New York, lake, 14 cents per pound; electrolytic, 13 3-4 per pound; London, standard £62 12s. for spot. Market steady. Fair business doing.

Lead.—New York, 3.75 per pound; London, £14 10s. for Spanish lead. Market steady and unchanged.

Tin.—New York, 28 cents per pound; London, £124 for spot.

The growing tendency to install tube mills as accessories of the stamp mill will have a strong bearing upon the gold industry of Canada, particularly that of Nova Scotia. Whilst the tube mill has not yet been standardized, different makers producing highly divergent types, yet several makes are efficient and economical. A study of the tube mill in its relation to South African gold milling induces the belief that several Nova Scotian gold mines could be revived if a well-designed equipment were installed. The designing and arrangement of overground equipment must meet the special requirements of each mine. The erection of standard stamp mills, ordered from the manufacturer's catalogue, is often a serious blunder.

Among the best gold miners of Canada are Nova Scotians who have worked in British Columbian camps and have had the added advantage of working the Nova Scotia lodes. Usually these men are expert hammersmen and can also handle a machine to great advantage. The Nova Scotian miner in fact is usually proficient in timbering also.

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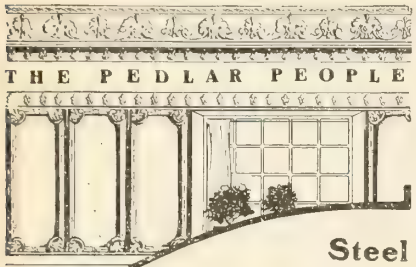
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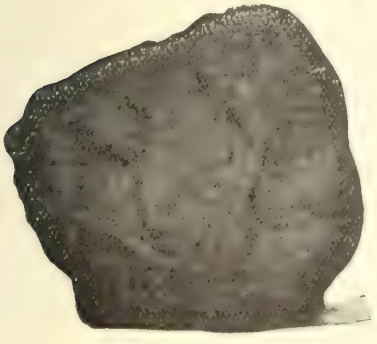
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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

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The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

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Applications should be addressed to :

The Hon. Minister of Colonization, Mines and Fisheries,
Parliament Buildings, Quebec.

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SEE INDEX TO ADVERTISERS PAGE XXVIII.

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The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

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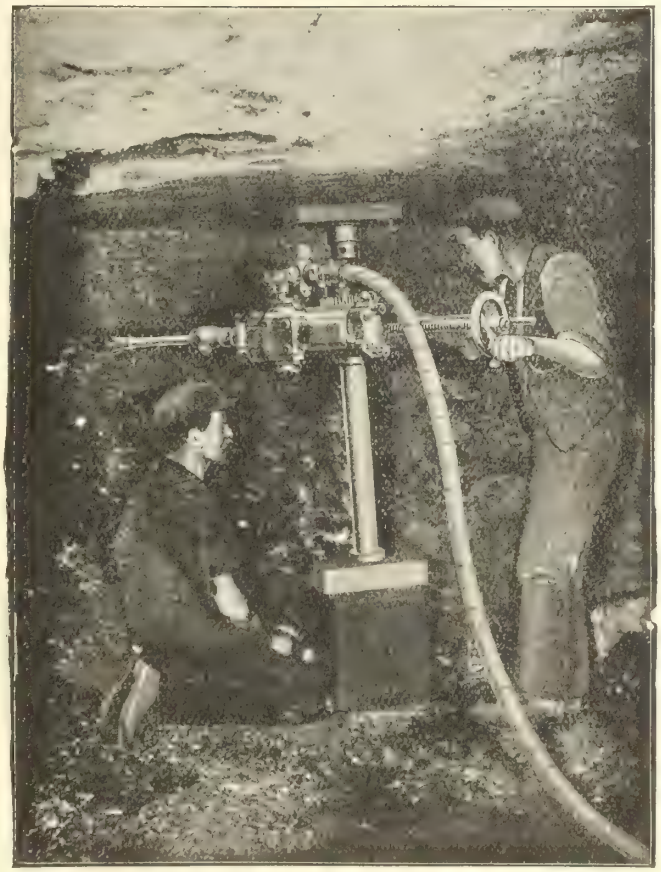
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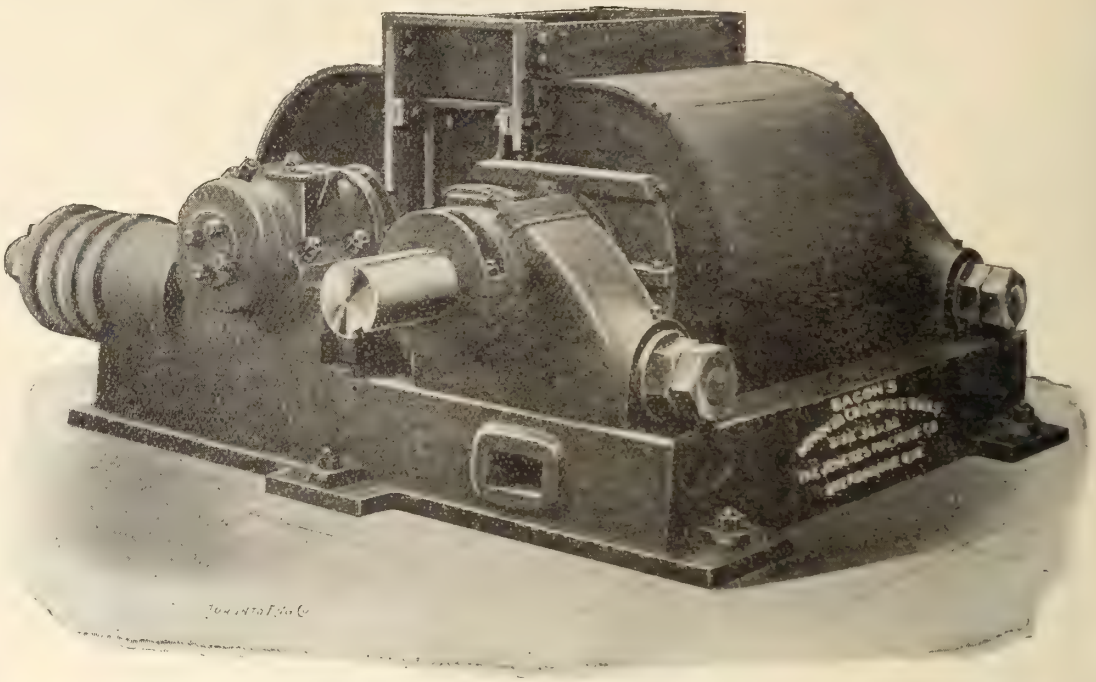
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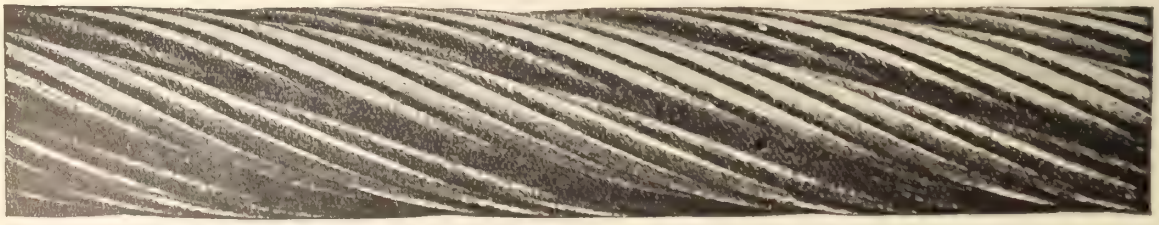


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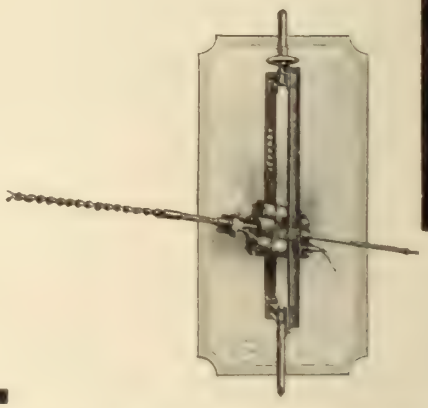
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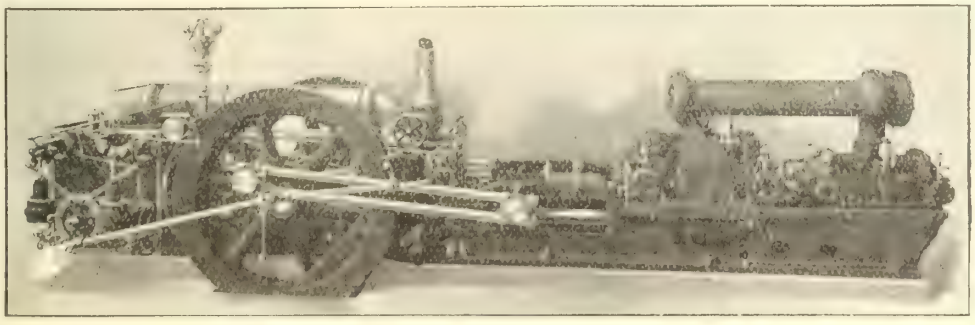
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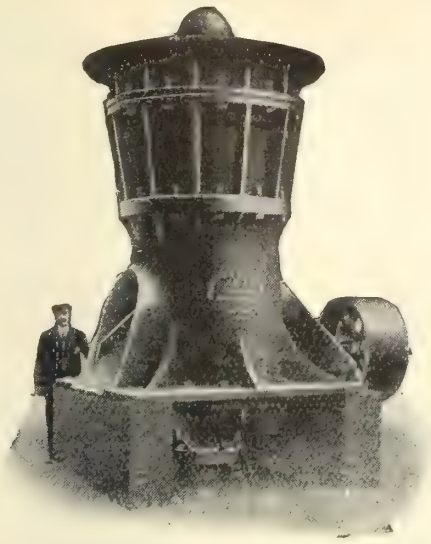
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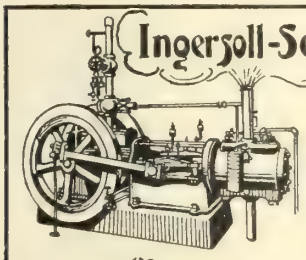
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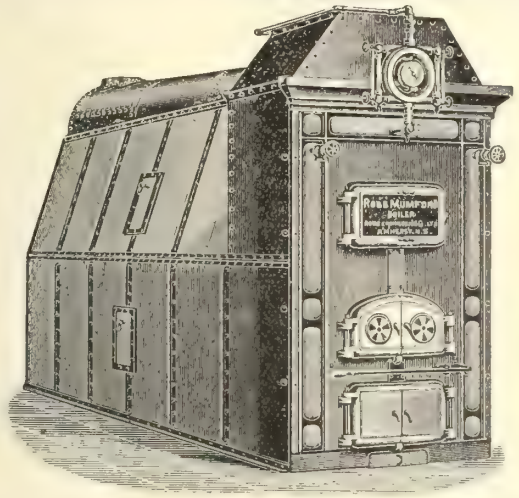
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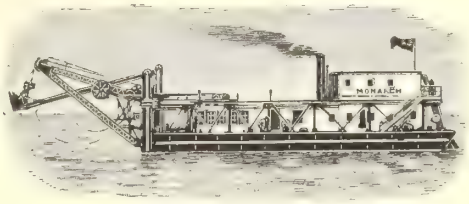
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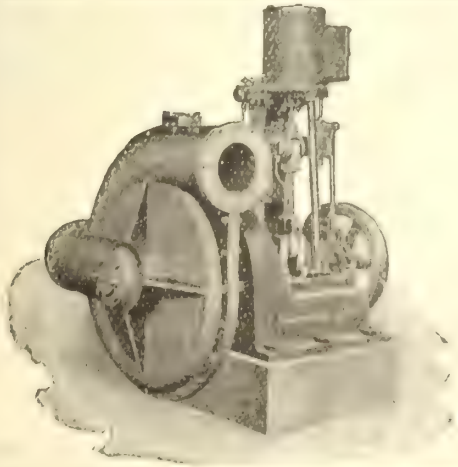
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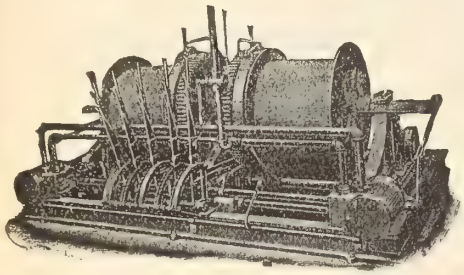
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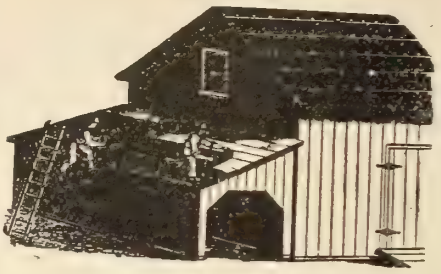
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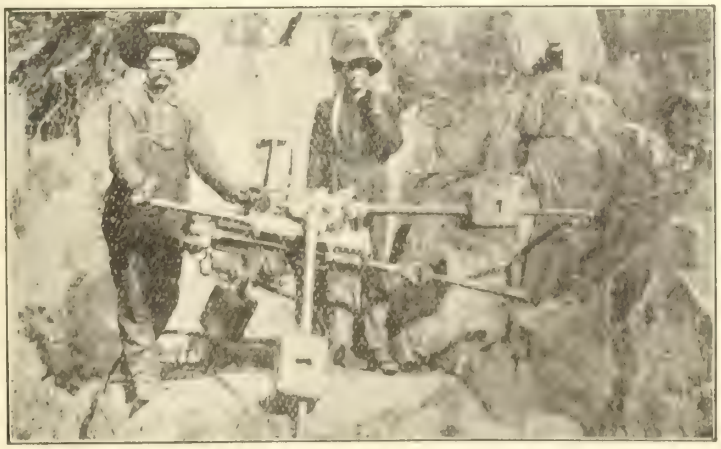
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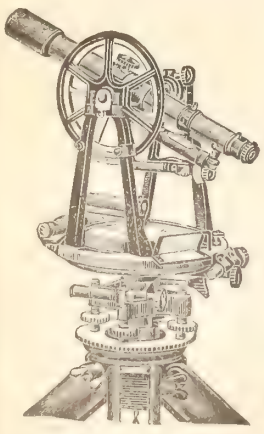
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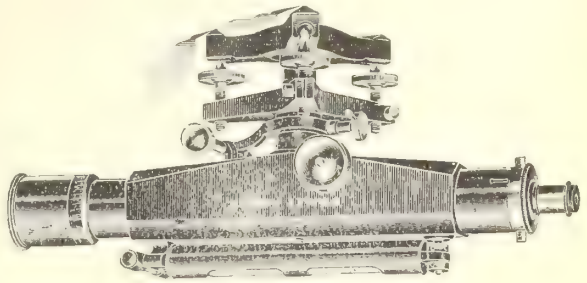
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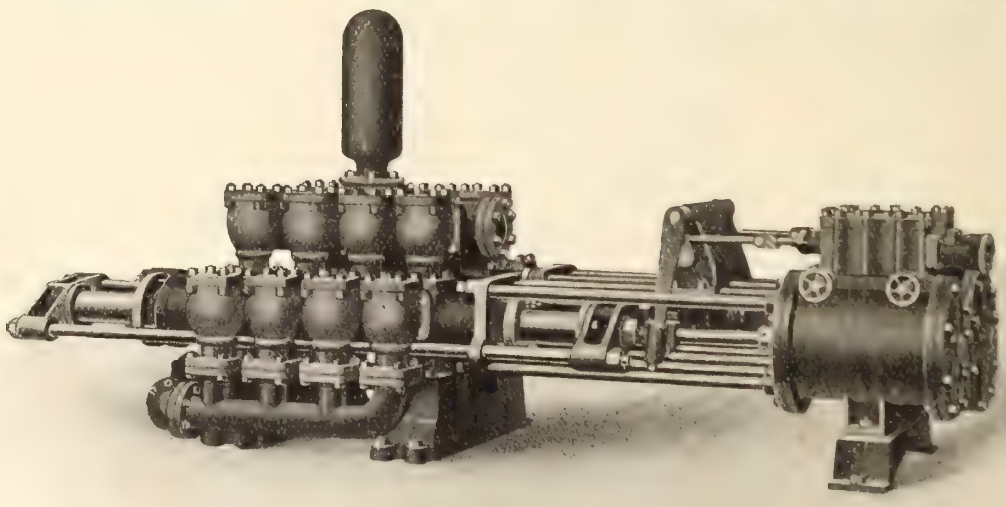
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THE CANADIAN MINING JOURNAL

THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

VOL. XXIX. TORONTO and MONTREAL, February 15, 1908 No. 4

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CANADIAN MINING INSTITUTE.

In our last issue there appeared portraits and short biographical sketches of Mr. H. E. T. Haultain and Mr. Milton L. Hersey, new candidates for the position respectively of Secretary and Treasurer of the Canadian Mining Institute.

As explained in a circular sent to all members of the Institute, the JOURNAL had intended taking no part in the approaching election. Unfortunately, just as we were going to press, a circular was issued from Montreal, signed by officers of the Institute, canvassing for the present Secretary and Treasurer. The circular might have been ignored had not the gentlemen who signed it used their official titles to lend force to their canvass. This regrettable feature could not be overlooked. The JOURNAL therefore hastened to signify its approval of the candidature of Messrs. Haultain and Hersey, and distributed a circular explaining fully the circumstances of and reasons for their nomination.

THE CANADIAN MINING JOURNAL is aware of the fact that its action may not meet the approval of every member of the Institute. On the other hand, it has good reasons for believing that a very large majority of the society's members will endorse its attitude.

Be that as it may, the JOURNAL felt that prompt rebuttal of the first circular was necessary. The Montreal letter was obviously written in haste (for its several paragraphs are self-contradictory) and with some degree of heat. This we deplore. We believe, however, that our own circular will throw light upon the situation.

If there is to be a contest, there is no need of making it a mere "row." No doubt, in the ardour of partizan enthusiasm a certain amount of feeling will be engendered. Yet this need not be carried to the extreme of attributing sinister motives and dubious methods to the other side.

It is one thing to express, very candidly, an opinion of persons and policies. It is a quite different thing to misrepresent the question on which opinions differ. The point at issue is clear. It is contended by certain members of the Institute that, for reasons fully developed in these pages and in the circular letter distributed by the JOURNAL, Mr. Haultain and Mr. Hersey will fill more suitably the two paid offices of the Institute than do the two present incumbents. The decision lies with the members of the Institute themselves. If the candidates of whom the JOURNAL approves are elected, so much the better. If they are defeated, the JOURNAL will loyally support the Institute as heretofore. But it will always reserve the right to criticize freely.

ALBERTA COAL LANDS.

There is a great area of coal lands within the Province of Alberta that is exempt from Government taxation. At least one-half the coal lands were disposed of at a time when coal rights went with surface rights.

Of last year's output only one-third rendered royalties to the Federal Government. That is, out of one million tons mined, nearly seven hundred thousand tons yielded no revenue to the Government. The royalties collected upon the remaining one-third amounted to $30,000.

However desirable the policy of granting free mineral rights to settlers may have appeared in the past, it is evident that now in Alberta it has worked as a deterrent upon development.

Coal lands and mineral lands generally are more easily negotiable from the Government than from private indivduals. Mineral lands held by settlers either lie untouched or, if discovery is made, the owner holds out for a price that is out of all proportion to the value of the deposit. In Nova Scotia the owners of "soldier grants" have proved an obstacle, often insurmountable, to the consolidation of mining areas.

Indeed, there is very little to be gained by the surrendering of mineral rights to settlers who must depend for their livelihood upon pastoral pursuits and whose knowledge of minerals is a negative quantity. On the other hand, there is much risk of loss to the Government and to the community. As in Alberta's case, certain mineral-producing lands are forever freed from yielding revenue to the Crown. Further, prospecting is, to a great extent, discouraged and the consolidation of coal-producing areas, a necessary preliminary to investment, is prevented or postponed.

Whatever may be said in justification of granting mineral rights to the agricultural settler, it cannot be denied that it does not conserve the future welfare of the country generally and of the prospector and miner particularly.

THE ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE.

On March 4th the first session of the annual meeting of the Canadian Mining Institute will be held. For the first time in the history of the Institute, Ottawa has been chosen as the place of meeting. Whilst the official programme has not yet been announced, we have no doubt that it will be one of greater interest than usual. Apart from an election of much more than ordinary importance, the fact that the meetings will occur whilst the Federal House is in session makes it the duty of every member, who can possibly arrange it, making an effort to attend.

The Ottawa members themselves are working heartily for the success of the event. The remodelled Russell House will provide ample space for the meetings.

The March gathering should assuredly be made impressive if for no other reason than that of giving the Federal Government a sufficient idea of the Institute's importance and strength. We hope and believe that the attendance will be larger than ever before.

TWO ESTIMATES.

In the *Mining World* of Chicago for January 18th is an article by F. C. Nicholas, entitled "Development of the Bonanza Creek Gold Mines."

Mr. Nicholas puts a valuation of $90,000,000 on the gold contents of the property of the Bonanza Creek Gold Mining Company, Limited, whose properties are situated on the "White Channel" in the valley of Bonanza.

As this valuation is greatly in excess of that of Mr. McConnell, of the Geological Survey of Canada, who gives as the total value of all the gold in the valleys of Bonanza, Hunker, and Bear Creeks, and the Klondike River together, the comparatively moderate sum of $56,000,000, we would like to ask Mr. Nicholas if his valuation is based on personal observation, or upon information derived from others. If the latter is the case, this fact should have been distinctly stated. In addition to his valuation of the property, Mr. Nicholas places a very high value on the stock of this company. Is this value, too, derived from personal knowledge of the properties?

CAPE BRETON COAL.

It is an ill bird that fouls its own nest. There is not much patriotism about the man who will depreciate in public the productions of his own country, while at the same time praising the productions of the land of an alien. We are impelled to these remarks by the recent utterances of an honorable member of one of the Houses of Parliament at Ottawa during a debate on supply. The name of the gentleman does not matter, as THE CANADIAN MINING JOURNAL has no politics, except the politics of Canadian mining. This gentleman remarked that in his opinion the icebreaker "Montcalm" should have been supplied with Pocohontas coal, and not with coal from Sydney, Cape Breton, which we are informed "is impregnated with sulphur." The word Pocohontas is a nice rolling mouthful and is often quoted by people whose knowledge of mining is little and therefore dangerous—to themselves—not because they know the grade of coal that is mined in the Pocohontas valley, but because they have heard somebody say it is good and the name sticks. The gentleman in question also said that none of the steamship companies would use Cape Breton coal because of its wonderfully rich contents of sulphur. It is hardly to be wondered that steamships calling at

New York do not use Cape Breton coal, but we think the steamboats of the C. P. R. are as good craft as the St. Lawrence icebreakers. Both of the "Empresses" have made record trips from land to land using nothing but this same much maligned Cape Breton coal. If we are not mistaken Montreal is largely heated and lighted by this same coal, and in short practically the whole of Eastern Canada is dependent on it. Perhaps the remarks of the honorable gentleman should not be taken so seriously. He was merely making political capital, and it is really surprising how little it takes to make that valuable commodity. We would suggest, however, that it should not be made at the expense of Cape Breton's natural resources.

THE BRITISH COLUMBIA COAL AND COKE TAX.

If legislatures and legislation were not imperfect, there could be no excuse for changes in our laws. The assurance of permanence may render imperfect enactments more valuable than intrinsically better laws that are subject to sudden change.

From its very character the mining industry must be based, so far as possible, upon settled conditions. Foreign and Canadian investors have sunk large sums of money in the mines of British Columbia, in the implicit belief that the present laws would remain unchanged, or that, at least, any changes made would be directed towards the encouragement of the industries upon which the Province is depending more and more for its prosperity.

Indirectly, the improbability of increased taxation has been accentuated by two existing conditions. The low current prices of silver, lead, copper and zinc have led to the temporary cessation of mining and smelting in several of the more important districts. To offset this the workmen have recently consented to a considerable reduction in wages. It is distinctly understood that this concession is made because of the present depression and the increased cost of operations.

Again, the necessity of nursing the smelting industries has been recognized by both the Federal and the Provincial authorities. Delegates representing the lead smelters of British Columbia are now in Ottawa asking for an extension of the bounty upon lead.

From all this it is evident that the smelting industries of British Columbia have not yet reached the stage when they can resist successfully the pressure of outside competition and the vagaries of the metal market.

This being granted, it follows naturally that it is illogical and suicidal to impose a fresh tax upon industries whose permanence depends upon present government assistance.

The bearing of this conclusion upon the new coal and coke tax is obvious. The smelters are mainly dependent upon coal and coke supplied from mines in the Province. An increase in the cost of production must be shouldered by the smelters and referred back by them to the metalliferous mines whose ores they smelt. The output of metalliferous mines already is taxed to the extent of two per cent. It is doubtful whether more than one or two copper producers can stand increased charges. It is certain that lead producers cannot. And in view of urgent requests for a continuance of the lead bounty the proposed tax is anomalous.

So much for that side of the question. We shall glance for a moment at the effect of the tax upon coal and coke producers.

By section 83 of the Crown Lands Act (1888) there was reserved for the Crown a royalty of five cents upon every ton of *merchantable* coal raised or gotten from any lands acquired under the provisions of this Act. A qualifying clause provides that no royalty be reserved on *dross* or *fine slack*.

Sections 3 and 4 of the Coal Tax Act (1900) imposes a tax of five cents per ton of two thousand two hundred and forty pounds upon all coal (except on shipments to coke ovens in the Province) shipped, exported, or in any way delivered from any mine since the first day of July, 1900.

Moreover, a tax of nine cents per long ton of coke was then placed upon all coke shipped, exported, or in any way delivered from coke ovens in the Province. A proviso is inserted remitting the tax upon coke manufactured from coal upon which a tax has already been paid.

As, however, no British Columbia coke is made from run-of-mine coal, this proviso has little bearing upon the subject.

The ostensible object of the Act under discussion is the abolition of royalty, which is paid now by only a part of the coal-producers, and the imposition of a flat tax of ten cents on every ton of coal and fifteen cents on every ton of coke. At first glance this seems equitable. But when the present condition of the smelting industries and of the more easterly coal mining districts is considered, the unwisdom of the change is clearly visible.

The collieries and coke ovens of the Crow's Nest Pass Coal Company at Fernie, and the Canadian Pacific Railway mines at Hosmer supply a large proportion of the smelters of Southeastern British Columbia. At both Fernie and Hosmer plans are being carried out whereby production will be materially increased. The fuel famine of last winter, the natural expectation of increased demand from the smelters and a growing market in the United States have warranted this expansion. But, were these collieries dependent upon the Provincial smelters for a market, they could operate only intermittently and without hope of immediate expansion. That they may be able easily to meet the needs of the smelters the collieries must seek other markets. The market across the border is held in the face of strong competition. Every cent added to the cost of producing coal makes their hold upon the outside market more precarious. The freight haul in the Rocky Mountains is long and expen-

sive. Labor and supplies are also high. Hence the narrow margin of profit may disappear.

We instance the Fernie and Hosmer collieries, as it is upon these that the tax will fall most heavily. The Vancouver Island collieries, in spite of all the advantages of cheap mining, plentiful labor and easy access to tide water, have maintained an unreasonably high price for their coal and coke. The lands of the largest collieries on tide water have been exempt from royalty. Thus the tax will be no such hardship to these as it will to the eastern producers. This fact merits consideration. A flat, uniform tax does not remedy inequalities.

Many other special features governing the production of coal and coke in the Rocky Mountain districts could be adduced. They all strengthen the conviction that British Columbia will strangle a growing industry and will frighten capital away from her coal fields if the new tax is imposed. Her neighbors will undoubtedly reap the benefit of this.

Cheap coke is a necessity to the smelters of West Kootenay and the Boundary.

THE PORT HOOD DISASTER.

The distressing news that ten men had been killed by an explosion in the south workings of the Port Hood-Richmond Railway & Coal Company was received on February 7th.

Details received later announced that all the bodies had been recovered and that no serious damage had been done to the mine. A rescue party, led by Manager McLellan, succeeded in bringing the bodies to the surface within three hours of the disaster.

Six of the victims were natives of Cape Breton and four were Bulgarians. Nine of them were married.

After hearing evidence of identification, the Coroner postponed the inquest until the 12th inst.

As the Port Hood collieries are by no means gasey, and as the inspector, after making his rounds two hours before the accident, reported all safe, it is probable that the explosion was caused by the accidental ignition of powder. The posture in which the men were found indicates that they had no warning whatever. The bodies were disfigured to such an extent that their clothing was the principal means of identification.

The Coroner's report will throw more light upon the subject.

DRILL TRIALS ON THE RAND.

After a thorough trial of the overground and underground work of a number of rival types of drills, the *South African Mines'* Trophy has been awarded to the "Gordon" drill. Although several of its competitors ran it close in overground work, where drilling was done in four granite blocks; yet underground the "Gordon" proved itself superior in all respects.

The contest, arranged by the enterprising *South African Mines,* was conducted under the supervision of qualified authorities. It was watched with keen interest by mining men all over the Rand, and the results have been commented upon widely.

The conclusions reached by those who followed the contest keenly are important. The importance of improving the quality and tempering of the steels in general use, the desirability of attaching to all drills in use on the Rand a water-feed or dust-allaying device to prevent phthisis, and the advisability of using higher air pressures, are amongst the points accentuated.

THE HALL MINING AND SMELTING COMPANY.

Press despatches of February 7th announced that all the assets of the Hall Mining & Smelting Company, Nelson District, B.C., had been placed in the hands of a received on behalf of British bondholders. The plant has not been in operation since August of last year. It is believed that after re-organization, the smelter will be remodelled and the company's mine, the Silver King. will be worked.

During the fiscal year ending June 30th, 1906, the Silver King produced 1,187 tons of ore, averaging 25.5 ounces silver per ton and 4.3 per cent. copper. Whilst mining operations showed a profit of about $6,000, the smelting loss more than counterbalanced this.

Reliable authorities state that the Silver King is a valuable property and that both the mine and the smelter can be operated with profit. The smelter includes a Huntington-Heberlein installation for the desulphurization of galena ores.

Apparently the management of the company's affairs has been handicapped by internal complications. No other reason is assignable for the closing down and the appointing of a receivership.

Editorial Notes.

The ninety-fourth meeting of the American Institute of Mining Engineers will be held in New York on the three days beginning February 18th. The election of officers will take place on the 18th.

The Toronto Exhibition Commission has as yet made no provision for the display of mining machinery. This is a very serious omission. It is hard to understand why the mining industry should be neglected thus.

Mr. Gray's first article on the mining operation of the Dominion Coal Company is a valuable contribution to our knowledge of that company's vast undertakings in Cape Breton. Mr. Gray writes with accuracy and a complete familiarity with his subject.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

F. W. Gray.

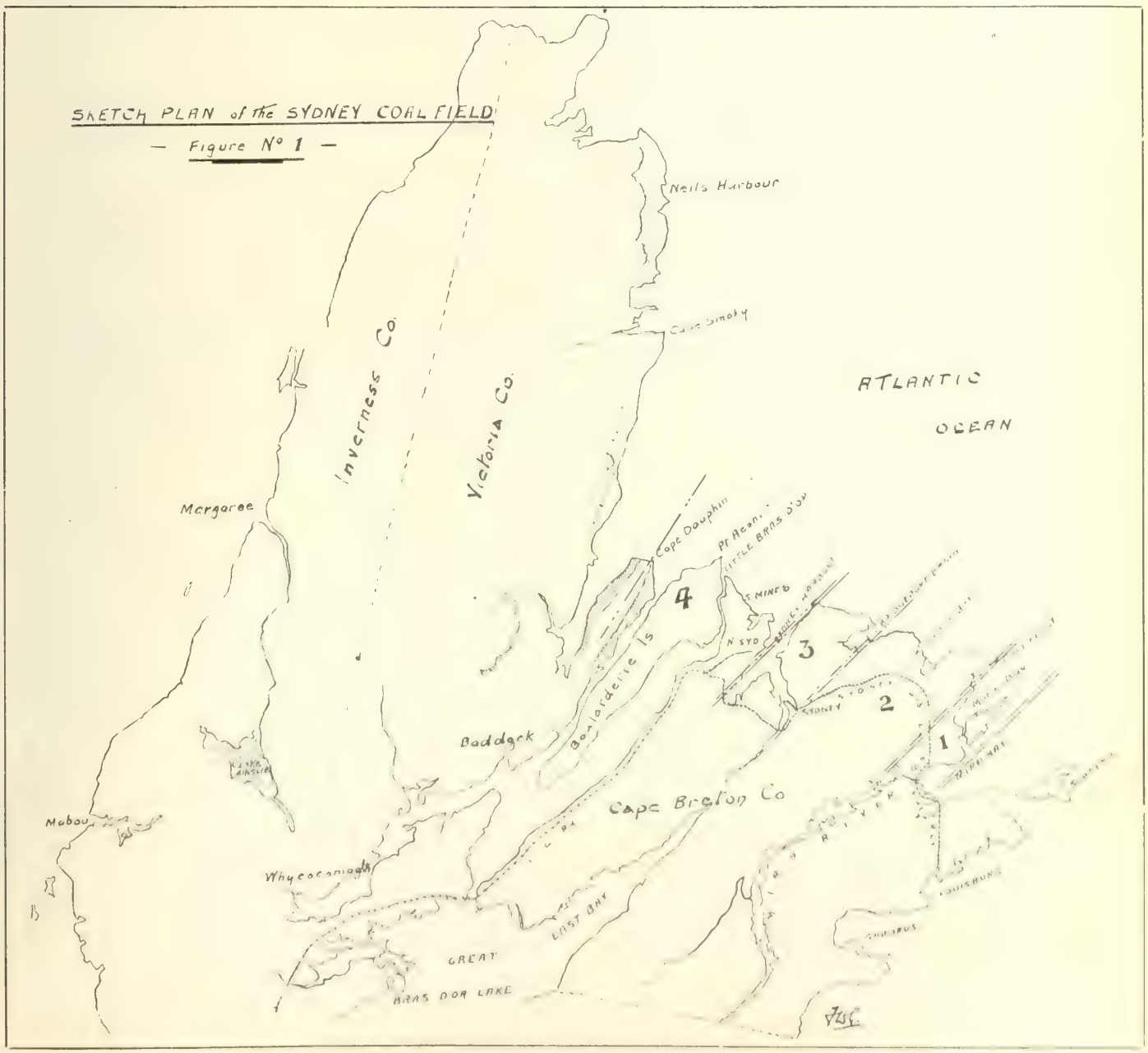
ARTICLE I.—GENERAL DESCRIPTION OF THE SYDNEY COAL FIELD.

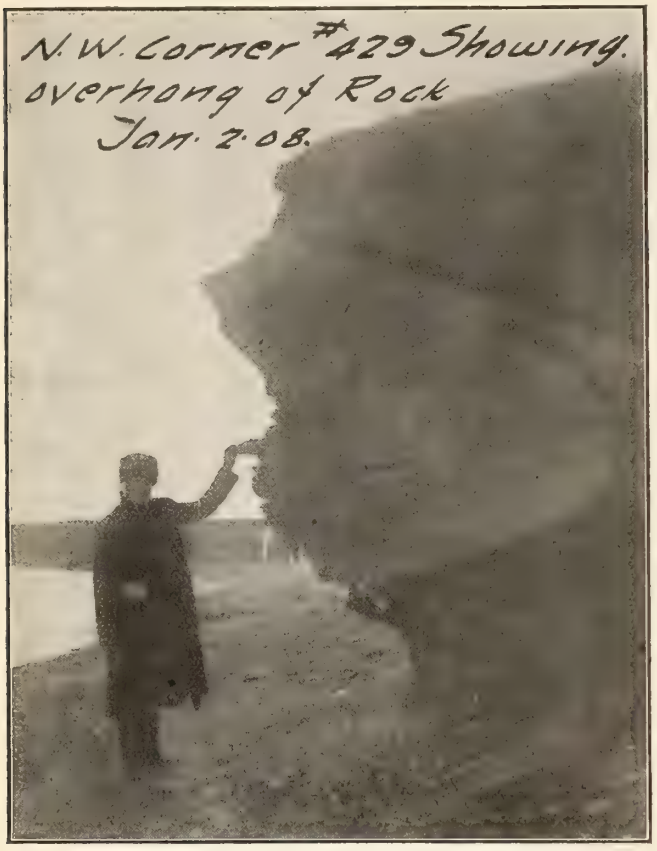
The mines of the Dominion Coal Company, which produce almost half of the entire Canadian output of coal, are situated in what is known as the Sydney coal field, an extraordinarily rich tract of coal-bearing country having a superficial area of 250 square miles, extending for a distance of 35 miles from the outcrop of the Millstone Grit at Mira Bay to the abrupt range of intruded syenitic hills that end in Cape Dauphin and form the northern shore of the Great Bras d'Or entrance and continue alonge the Atlantic seaboard of Victoria County. The manner in which the Cape Dauphin promontory rises precipitately draws the attention both from a geological and scenic aspect.

The great basin of the Sydney coal field is divided into subordinate basins by folds in the strata that run approximately northeast and correspond roughly with the depressions that form the strikingly parallel arms of the Bras d'Or Lake and the Mira River. The basins thus formed are, counting in order from east to west (see accompanying sketch plan):

1. The Morien Basin (sometimes called Cow Bay Basin), bounded on the east by the crop of the Millstone Grit and on the west by an anticline that runs into the sea at Cape Percy.

2. The Glace Bay Basin, bounded on the west by the Bridgeport anticline, which is parallel to the Cape Percy fold, and parts the Glace Bay Basin from the Lingan-Victoria exposure.





Overhang of Rock near Point Aconi.

3. The basin-like formation that is a feature of the Morien and Glace Bay fields is not so pronounced in the Lingan-Victoria tract, but nevertheless it may be properly classed as a basin having its western limit somewhere under the waters of the entrance to Sydney Harbor. It is not necessary to assume that the measures are interrupted, and it is now very generally supposed that they are continuous with those on the other side of the water.

4. The Sydney Mines Basin (or the Bras d'Or Basin) extends from the waters of Sydney Harbor to the termination of the coal measures by Cape Dauphin.

In all the basins the general trend of the dip is seawards, and the seams rapidly gain cover under the ocean, as the floor of the Atlantic shelves very gradually indeed, the present coast line with its comparatively insignificant cliffs being the result not of any dislocation of the strata but simply of erosion by the sea, as is very clearly demonstrated by Mr. Brown in his treatise on the coal fields of Cape Breton. The erosive action of the ocean is to be daily witnessed along the sandstone and shale cliffs that compose the coast line in the productive measures. The heavy seas that beat along these shores are assisted in their attacks by the disintegrating effect of the winter frosts, and the piles of debris that line the bases of the cliffs in the spring bear eloquent witness to this until they disappear with the ebb of the next storm. It was the exposure of thick coal seams along the coast by the sea's action that first drew attention to the coal wealth of Cape Breton. The photographs accompanying will convey some idea of the ceaseless encroachment of the Atlantic on these shores. In one photograph the overhang of the cliff will be noticed, weighted by huge icicles, and in another a spruce tree is about to slip into the sea. These two photographs are taken in the neighborhood of Point Aconi. The other view is near Northern Head on Lingan Bay—or Indian Bay—and is very typical. It is stated that at some points the yearly encroachment of the sea averages from five to seven inches, and the shape of the coast line is constantly changing.

The extent of the submarine coal field is unknown and cannot be conjectured, but the reappearance of the coal measures at Neil's Harbor, about 35 miles north of Cape Dauphin, may indicate that the Sydney coal field is only the lip of the saucer, only a fragment of the circumference of a vast submarine coal deposit that may for all practical purposes extend indefinitely. However this may be, it is certain that there is submarine coal to be won up to the limits of the haul that is permitted by the present stage of mechanical haulage.

Vast, however, as are the submarine coal resources of Cape Breton, they are as yet practically untouched with the exception of the workings of the Nova Scotia Steel & Coal Company under Sydney Harbor and the workings of the Dominion Coal Company in the Hub Seam off Table Head. It is rather a coincidence that probably the most extensively worked submarine coal field, outside of those in the north of England, are situated under the waters of Sydney Harbor, New South Wales. That the value of the Cape Breton sea coal is appreciated by the Provincial Government is evidenced by the fact that the Premier of Nova Scotia has recently approached the operators on the advisability of getting outside expert advice to aid them and the Government in drawing up laws and regulations that shall conserve the property of the nation whilst affording assistance to the operators in their development of the submarine coal fields. It is evident that the present regulations are inadequate and require modification in view of the extensive experience that has been gained in submarine mining both in Cape Breton and in other parts of the



Recent Slides near Point Aconi.

world since the present code of regulations was drafted, and it is to be hoped that the Government having taken this initiative will secure the very best advice that is to be obtained for this important purpose, as they no doubt will.

The Sydney coal field is justly famed for its varied and numerous fossil flora. Near Cape Percy is a remarkably fine exposure of fossil trees imbedded in the face of the cliff, and the shales and sandstones along the coast contain excellent specimens of plant remains, foot prints, ripple marks, and marine fossils. The fossil zones are well defined, and are associated with the seams in a regular manner. There are a few beds of what are locally known as "corrugated shales" which are composed almost entirely of the fossil remains of small crustaceans, which, like the "mussel beds" of the coal fields of the English Midlands, are remarkably persistent in their horizons, a fact that was well brought out by Dr. Ami in the Steel-Coal trial at Sydney recently, where he proved conclusively the equivalency of the coal seams and the identity of two separated portions of the Phalen Seam in the Glace Bay Basin, a thing, by the way, that nobody had ever questioned before the famous trial, and to prove which was absurdly easy to any geologist who knew his business. It was amusing to hear the wealth of detail and geological lore that was brought forward to sustain a fact that had been accepted since 1874, and which must now be settled for all time for the courts have said it, although, unless the newspapers lied, somebody did say that geology had nothing whatever to do with the Phalen Seam! Indeed the regularity and sameness of the Cape Breton coal seams is quite characteristic when they are considered as a whole, the dips are very uniform, except near the folds, and in the more or less disturbed Morien Basin; the thickness of the seams varies very little, there are no faults or dislocations of the strata, the seams are clean and free from dirt bands, and generally speaking the mining conditions are easy, and, except in the submarine territory, present no engineering difficulties of any moment. In the Report of Progress, Geological Survey of Canada, 1874-5, Mr. Chas. Robb referred to the seams of the Sydney coal field as follows: "In taking a general view of the mode of occurrence of the coal seams in this field, it appears that, although local variations are neither few nor small, their similarity of conditions and persistency over great areas is very remarkable. The disturbances which the strata have undergone are not of such a nature or amount as to occasion any great uncertainty in regard to the equivalency of the various seams at different points." Referring in particular to the Glace Bay Basin, Mr. Robb said: "The attitude of all the seams in the Glace Bay Basin (extending for a length of about 12 miles) as ascertain by careful measurement and recorded on the map is a striking proof of the general regularity of deposit and the absence of faults which characterize this district."

The Dominion Coal Company control areas in each of the subordinate basins as follows: Areas at Point Aconi, largely submarine, the whole of the Lingan-Victoria and Glace Bay seams, and areas in the Morien Basin. At the present time their operations are confined to the Lingan-Victoria and Glace Bay sections, and more particularly to the latter field, with which we will deal in the next article. The seams in the Glace Bay Basin have been more extensively worked and are better known by name than those corresponding to them in the other basins. Taking the table of equivalency given by Mr. Robb, we have the following seams in the Bridgeport sections:

	C.	M.
Hub Seam	9 ft. 5 in.	
		344 ft. 4 in.
Harbor	6 ft. 1 in.	
		238 ft. 7 in.
Boutillier	4 ft. 0 in.	
		92 ft. 1 in.
Back Pit	4 ft. 0 in.	
		83 ft. 3 in.
Phalen	8 ft. 7 in.	
		108 ft. 1 in.
Emery	1 ft. 8 in.	
		279 ft. 2 in.
Gardiner	5 ft. 9 in.	
Total coal .....39 ft. 6 in.		



Overhang of Rock near Point Aconi.

The better known seams bear names in the different basins as follows:

	Morien.	Glace Bay	Lingan-Victoria.	Sydney Mines
Hub Seam		Hub	Barasois	Chapel Point
Harbor	Blockhouse	Harbor	Victoria	
Phalen	Mc. Aulay	Phalen	Lingan Main	Sydney Main
Emery	Spencer	Emery	McGillivray	Collins

It is solid proof of the painstaking and careful character of the work of the Geological Survey that the maps and table of the report of 1874-5 are yet accepted as the standard reference in all matters relating to the geology of the Cape Breton coal measures, and later prospecting and discoveries only confirm their main findings. The next article of this series will deal more particularly with the mines on the Phalen Seam in the Glace Bay Basin.

A HAND POWER ROCK DRILL.

L. B. Orchard.

The accompanying sketches and photograph are of a hand power rock drill which has proved from experience to be a very efficient machine.

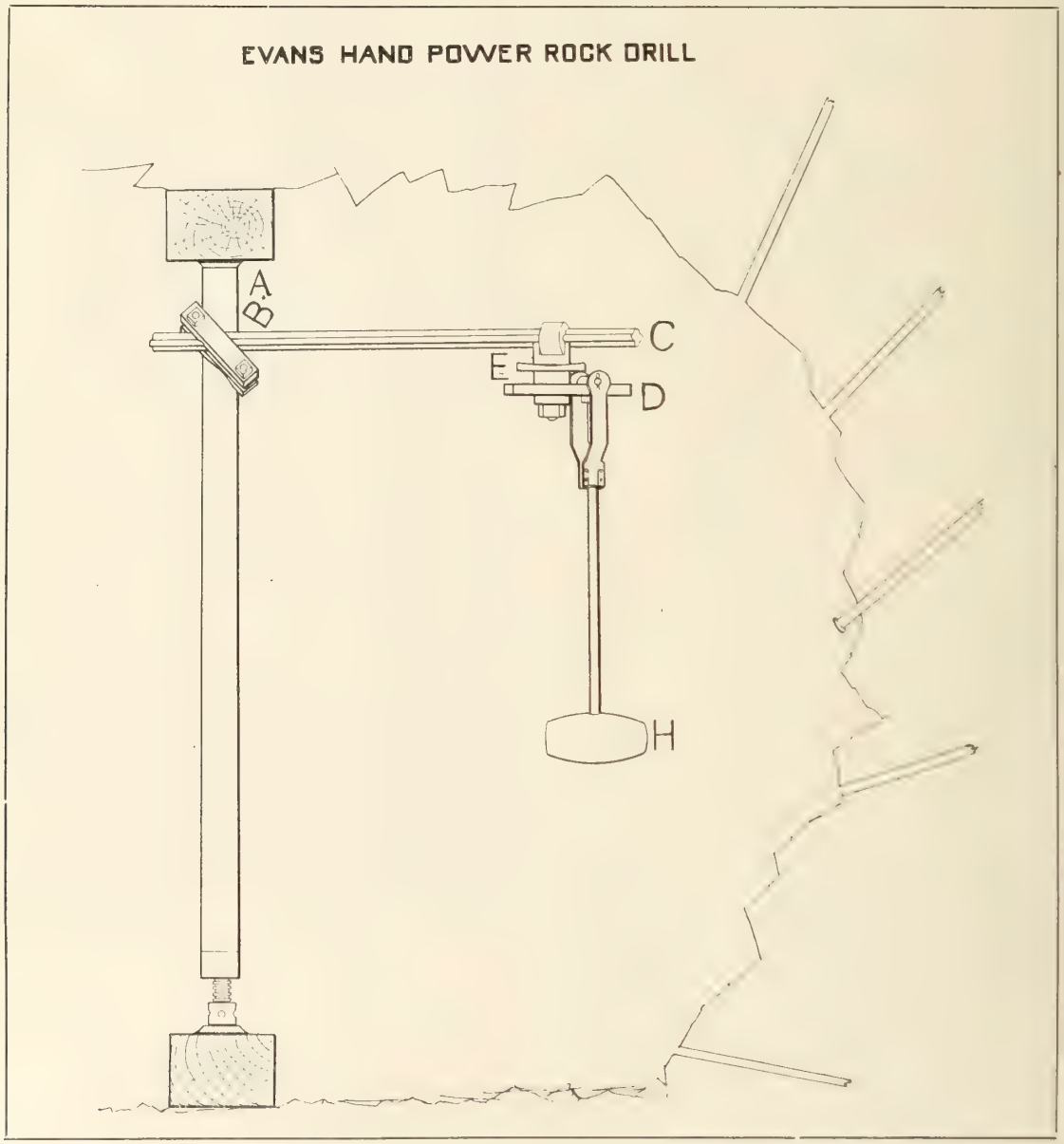
It was first experimented with about two years ago, since when, time and experience have created many improvements. In its present condition it thoroughly fulfills its requirements, the mechanism is simple and there are no delicate parts to get out of order. Little concern has been given to the possibilities and advantages of a hand power rock drill, which no doubt, is due to the fact that so far no hand power drill has been introduced that will amply fulfill the requirements of either the mining engineer or prospector.

In this article it is my intention to show the advantages that will accrue from its use, both in prospecting and in opening up a mine and in further development in mines where compressed air may already be installed, but before doing so it will be advisable to give a brief description of the machine itself.

A. A small column as used with power drills.
B. Clamp of bent steel rod, threaded at ends.
C. 1 1-4 inch steel arm.
D. Short moveable arm.
E. Double wedge ring.
H. Hammer.

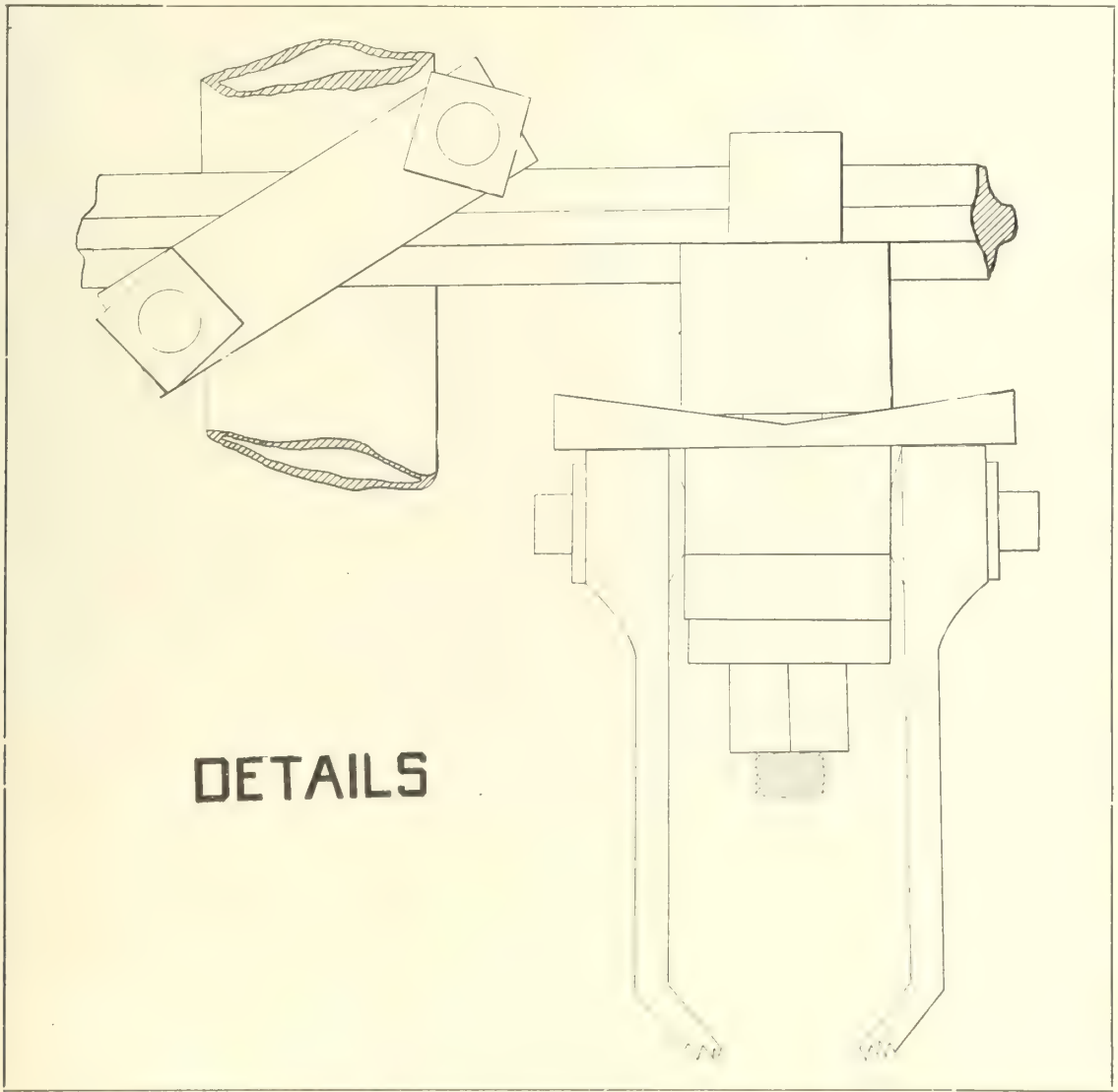
Of course it will be readily seen that this machine can only be used for raising or drifting. The erection of the machine takes but a few minutes, and the whole face of a drift can be drilled off from the initial setting of the column. The machine is set up in four sections—the operation is obvious from the accompanying sketches, and so need not be described; the double wedge ring E is for plumbing up the hammer, a tap in the required direction being all that is necessary; D is a short moveable arm, which enables the hammer to be moved to any necessary position.

The machine is operated by two men—one twisting the drill, the other striking. For operation on a lifting hole



the man striking sits on a block of wood and grasps the drill with both hands just above the hammer head and strikes with a similar action to that used in rowing, a full swing of the body from the hips, the hammer striking the drill while still on a downward direction; on others, the uppers, breast and cut holes the striker stands. In this position only one hand is required for striking; the momentum of the hammer is very great, and all that is necessary is a sharp pull on the rebound of the hammer and a push at the other end of the stroke—a hard rock can almost be called a valuable help, as the rebound is so much greater, and hence assists the operator. On an upper hole the hammer will swing and strike the drill deep holes, which means a more powerful blast, and so less drilling for the breaking of the ground.

Only the very best steel should be used—Jessop's or Cammel's English brands are good—but a cheap steel cannot stand the heavy blows. In the tests 1 1-2 inch to 2 inch holes were put in, using 1 1-8 inch and 1 1-4 inch X steel. The speed of the hammer varies according to the position of the hole, but from 40 to 60 blows per minute can be given on a 3 1-2 foot shaft and a hammer of 80 pounds. The hammer is of cast iron, with a steel facing, beveled, which enables the successive blows to hit fair on the drill head as the drill drives home. It has been pointed out to me that one disadvantage was



Evans Hand Power Rock Drill.

twice, after the initial blow, which shows that the machine is very easy on the men. Another very pleasing feature about it is that it is impossible for the striker to miss the drill, and this in itself should be very gratifying to many who have suffered tortures, mental and otherwise, whilst twisting for a novice striker!

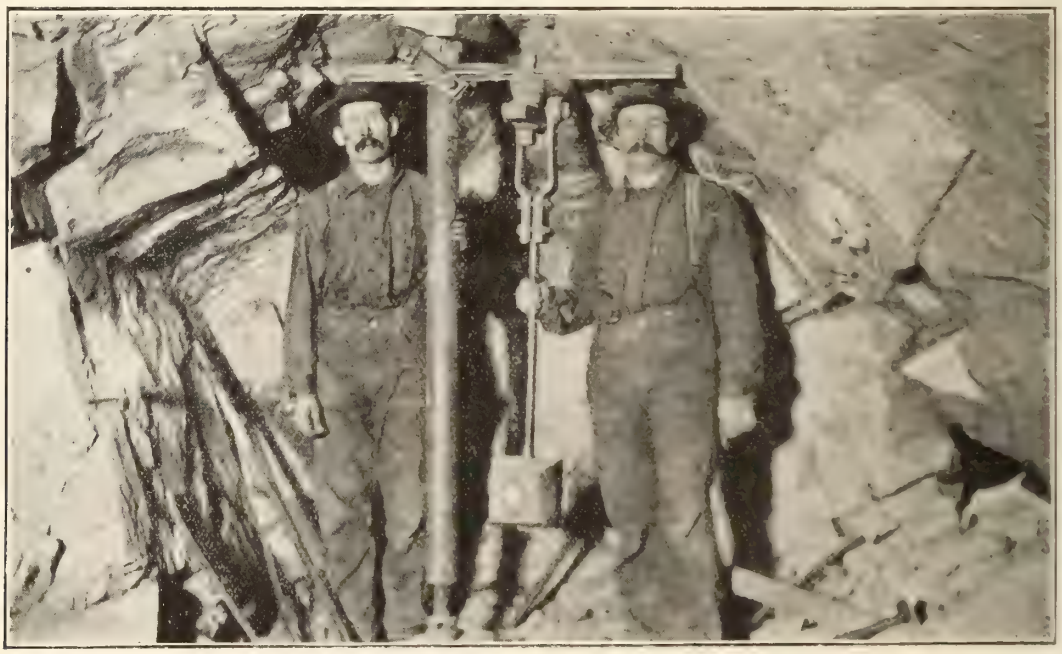
Hammers of different weights up to 120 pounds have been tried, but the most satisfactory weight has been found to be 80 pounds. In soft ground too hard a blow will cause the drill to cut too deeply and so stick, whilst in hard ground the drills will bend. With an 80 pound hammer one can understand that this makes quite a powerful machine, which enables men to put in by hand that the "cut hole" was a "dry hole," but in practice I have so far failed to see the disadvantage. True enough a "water hole" is usual, and perhaps a little better, especially in the case of a power drill, but this slight disadvantage is so outweighed by other direct advantages that it can be ignored.

The machine is especially adapted to prospectors in new districts or in small mines where power drills are not installed; it is very easily taken apart and weighs all told under 200 pounds, the heaviest piece being the hammer—80 pounds—and all can be neatly packed on a horse.

In large mines, even where the air drills are installed,

it is very often desirable to drive small prospect drifts but not considered worth while to use a power drill. Here this machine will be found very convenient—the drill can be moved easily from one part of the mine to another, a much smaller drift can be put in than can be done by hand steel, and it can be driven very much faster and cheaper. If necessary two machines can operate simultaneously at the face of the drift without any interference with one another. Cheapness is a very important item in development work, and it is here where this machine should prove of value. All will readily understand and agree (except of course the office management and shareholders) that a certain amount of development work has to be done in any mine, and if that cost can be considerably reduced so much the better for the mining engineer and shareholders.

By a series of careful tests in various grounds the drill has shown an actual saving of 50 per cent. in the cost of drilling. In a cross cut from a main drift the Evans machine drove in one direction and hand steel was carded for the type already described. Evans Bros., of Marysville, B.C., are the inventors, and have, I understand, taken out basic patents in Canada, United States and Mexico.



Evans Hand Drill Set Up.

used in the opposite. Both were in similar ground, and after about three weeks' work on measuring it was found that the Evans drift was in almost half as far again as that of their opponents. The ground was not very hard, and so rather favored the hand steel men. This was a true and fair test.

It must not for one moment be thought that it is the intention that this drill could or should supplant power machines—far from it. But of this I am sure, that the prospector will find that he can do more and better work with it, and that with a minimum expenditure of energy, whilst to the engineer it should prove a valuable aid in the necessary development of his property.

It is so simple that any miner can put it up and use it. It is strong and well built, and should last a lifetime. I don't think even a miner can put it out of business or break it, and as we all know that is very little that he can't do!

The photograph shows the drill set up at the Bay Mine, B.C. This was the first machine made, and it will be noticed the hammer is square; this has now been dis-

NOTES ON CANADIAN ASBESTOS MINING.

By Fritz Cirkel, Mining Engineer, Montreal.

The asbestos industry in the Eastern Townships, although suffering from the financial depression across the dorder, and the consequent sluggishness of the market at the present time, plays a prominent part in the mineral production of the province, and if the demand during the current year proves as large as it was last year, with such satisfactory prices, we shall witness quite an increase of production, especially of the fibre quality of the mineral.

In addition to the established Black Lake and Thetford districts, the East Broughton asbestos region, through the valuable discoveries therein of asbestos-bearing ground, has come into prominence of late. From the fourth up to the tenth range in the Township of Broughton on all lots numbered 13, asbestos has been discovered in more or less economic quantities, and the explorations which have been carried on for the last year or two undoubtedly tend to show that this East Broughton district will before long become a prominent factor in the asbestos industry.

When Mr. H. H. Williams, the general manager of the Broughton Asbestos Company had the courage to attempt the production of fibre from the areas that he has since so successfully worked, many an asbestos man had his grave doubts as to the outcome of the venture. It was even predicted by some that this enterprise would be a complete failure, on account of the comparatively small quantity of crude asbestos to be found. How wrong these men were in their judgment will be seen from the fact that the Broughton Company not only has made innovations and improvements in their mill to meet

the peculiar conditions governing the occurrence of asbestos in that region, but has recently doubled its plant and capacity.

Other companies have sprung up and have either built mills or have made arrangements for doing so. The Quebec Asbestos Company has been working now for a number of years, and treats the rock in a 100 ton mill. The Eastern Townships Asbestos Company has just completed a 200 ton mill, while the Frontenac Asbestos Company, and the Boston Asbestos Company are each constructing a 300 ton plant on their properties to the east of the Quebec.



New Asbestos Mill of the Eastern Townships Asbestos Company, East Broughton, Que.

When all these mills are completed we shall have five mills in operation which will handle in the aggregate about 1,000 tons of asbestos rock per day, or produce from 80 to 100 tons of fibre.

The pits at the old Miller and Tanguay properties have recently been pumped out and examined by an expert; seven tons of the rock from both properties have been subjected to a mill test, and the results have been highly satisfactory to the owners. Some years ago the Miller mine had been worked for crude asbestos only, and the qualities produced are said to have been equal to those in Black Lake.

Quite a considerable showing has been made on the Tanguay property; here in a shaft 15 feet in depth, regular vein asbestos has been found similar to the crude asbestos of Thetford, while in the western part a number of outcrops exhibit the fissured serpentine asbestos, which is so characteristic of that locality.

On the Tachereau property, the most westerly asbestos property of East Broughton, quite a number of asbestos outcrops have been laid open. A company is being formed now in Quebec which will erect a mill on the premises.

The new mill of the Dominion Asbestos Company in Black Lake, which has been erected at a cost of some $150,000, has had the first trial run to test the machinery some few days ago. A special feature of this mill is the absence of the Cyclone pulverizer, which has been entirely replaced by a series of coarse and fine rolls. The company that is building this mill has acquired some asbestos ground from the Standard Asbestos Company, and it is said that when everything is in running order from 35 to 40 tons of asbestos will be produced daily.

The asbestos property belonging to the Black Lake Chrome & Asbestos Company, located near Black Lake, below the railroad track has recently been examined by an expert, and it is reported that negotiations are under way for the acquisition of the property by a powerful syndicate.

The Union Asbestos Company, controlled by German capitalists, and operating on the high surpentine ridge 900 feet above the railroad track at Black Lake, has resumed operations, after a shut down for over 4 years.

THE PROPOSED UNITED STATES BUREAU OF MINES.

From the Director of the Geological Survey of the United States, Dr. George Otis Smith, we have received a copy of a letter submitted by him to the Secretary of the Interior. We reproduce this letter in its entirety. It is most significant to Canadians. The results of the present movement in the United States and the final determination of the best relationship to be established between the the Survey and the new technologic department will have a very direct bearing upon our own Departments at Ottawa.

January 7, 1908.

The Honorable

The Secretary of the Interior.

Sir:—

I have the honor to submit the following statement, in reply to your request for an expression of an opinion relative to the desirability of a more extensive recognition of the mining industry by Government investigations:

The beginnings of federal investigations of mineral resources are to be traced back to the early part of the last century, when Lewis and Clark were instructed to pay special attention to the geology and mineral resources during their exploration work. The explorations and surveys which were continued during the first half of the nineteenth century were further recognition of the duty the federal government owed the people in making known the resources of the great unexplored western half of the continent. These explorations were particularly actively pushed after the discovery of gold had focused public attention on the mineral wealth of the trans-Mississippi region. While the results of these various surveys were of inestimable value to the development of the mining interests of the regions which they covered, yet there was lack of co-ordination and an absence of a comprehensive plan covering the entire field. Moreover, it had not yet been recognized as the province of the federal government to investigate the resources of th entire national domain and not simply those of the public lands.

In 1866 a more direct attempt was made to aid the mining industries by an appropriation which authorized the Secretary of the Treasury to "collect reliable statistical information concerning the gold and silver mines of the Western States and territories." Though this

investigation received very inadequate financial support, yet the results obtained by Dr. R. W. Raymond were of the utmost value to the mining interests.

When, in 1879, the United States Geological Survey was authorized by Congress, all other federal surveys of a similar character were abolished, and the office of Commissioner of Mineral Statistics under the Treasury Department also lapsed. The organic law provided that the Director of the Geological Survey "shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources and products of the national domain." It is to be noted that this authorization, besides providing for geologic investigation also directly authorizes the study of mineral resources and the products of the national domain. It would appear, therefore, that Congress believed it was providing for all phases of work which should properly belong to a mining bureau. In any event, the first director, Clarence King, regarded the law as a justification for him to undertake investigations of not only a geologic character, including examinations of ore bodies, but also the study of mining and metallurgical methods. This fact is clearly shown in the summary of his first report, wherein he provides for the following publications, based on investigations inaugurated by him:

Geology and Mining Industry of Leadville, Colorado.
Geology of the Eureka Mining District.
The Copper Rocks of Lake Superior.
History of the Comstock Mine.
The Comstock Lode.
Mechanical Appliances Used in Mining and Milling on the Comstock Lode.
Coal of the United States.
Iron in the United States.
The Precious Metals.
Lesser Metals and General Mineral Resources.
The Uinkatet Plateau.
Lake Bonneville.
Dinocerata.

Out of these thirteen publications it will be noted that ten were to be devoted to the subject of applied geology and technology, and it is evident, therefore, that King regarded the U. S. Geological Survey as being charged with the duty of directly serving the mining industry of the country. Unfortunately, the broad plan of investigation which King had outlined could not be carried out because of the inadequacy of the funds provided for the work. It appears that King's successor, Major Powell, on this account established as his policy the plan of carrying on the fundamental geologic work which he knew was absolutely essential as a preliminary to the solving of the problems connected with economic geology. Major Powell's success, therefore, as an administrator of scientific work was due to the fact that he laid the plans on broad scientific lines. He also organized a division of statistics and technology, but, unfortunately again, this work received so little support that not much original investigation could be carried on.

In 1894, when Mr. Walcott took the leadership of the Geological Survey, he was quick to realize that the time had come when more attention should be given to the immediate wants of mining interests. His plan, therefore, involved investigation of nearly every phase of the mineral resources of the country, though at the same time he did not curtail the study of the larger geologic problems. Probably the most important feature of Mr. Walcott's administration from the standpoint of mining was improvement in methods of collection of statistical data, and by his advice this work was extended to include that of the previous metals. Mr. Walcott went back to Clarence King's original plan of placing the supervision of the collection of mineral statistics in the hands of the expert economic geologists, as being the only men who could have a comprehension of the resources to be condsidered. As a result, the statistical work of the Survey is on the highest plane and is frequently quoted in this country and abroad as an example of what all other countries should inaugurate. Under Mr. Walcott, too, technologic investigations were inaugurated; but these were limited by the appropiations to definite fields.

Under both Powell and Walcott the development of topographic mapping of mining districts was actively pushed. This phase of the Survey work, like the investigations of geologic problems, is of fundamental importance to all economic work.

To summarize briefly the items in the work of the Geological Survey which bear directly on the mining industry:—

1. Annual reports showing the mineral production of the various mining districts and the various mineral products and also those which summarize the mining development throughout the country. These reports have the most direct bearing on mining, but they could only be prepared because of the extensive investigations which had preceded them during the existence of the Survey.
2. Monographic treatises on particular mining districts or particular kinds of mineral deposits.
3. Geologic maps, which must form the basis of the study of the distribution of mineral products. An area of 138,536 square miles is already covered by these maps.
4. Reports on water resources, many of which pertain to power available for mining.
5. Topographic base maps for the use by mine operators, mining engineers and prospectors, as well as for the use in the study of geology.
6. Technologic studies of mineral products. This so far has been practically limited to the investigations of the utilization of the mineral fuels and building material.

The Survey investigations relating to mining have all been approached from the standpoint of the scientist, a policy believed to be in accord with the spirit of the Congressional enactment establishing this branch of the public service. The present importance of economic or applied geology is to a large extent the result of the Survey's activity and the practical value of its contributions has won world-wide recognition. In the present organization of the Survey, two divisions of the Geologic Branch and one of the Technologic Branch are devoted exclusively to the mining industry, while a large part of the work of the Technologic Branch and of the Division of Geology and Paleontology and of Chemical and Physical Research in the Geologic Branch, contribute directly to the aid of the mining industry of the country, not to mention the indirect, but important service rendered by the Water Resources Branch and the Structural Materials Divisions of Mining and Mineral Resources and of Alaskan Mineral Resources, are at present keeping in close touch with the mining industry. Through their work, the Survey is in possession of complete lists of the mines of the United States and also nearly complete lists of Alaskan mines and from these mines the division receives statements of annual production. On this basis summaries of the state of the mining industry at the

close of each year are prepared and published. The importance of this statistical work has been clearly stated by Dr. R. W. Raymond, formerly Commissioner of Mineral Statistics, and an eminent authority among mining engineers, who, moreover, has recognized the Survey as the successor to the investigations and publications inauguarated by him.

The Geological and Water Resources Branches have for several years been conducting a joint investigation of the debris problem, which had never before been adequately considered on a scientific basis. The technologic work relating to mineral fuels has been authorized by appropriation items, yet this work undertaken under Director Walcott differed little in scope from investigations planned by Director King, but necessarily for a long time neglected in the absence of any specific appropriation by Congress.

While it might be held that the organic authority granted the Director to examine the geologic structure, mineral resources and products of the national domain is sufficient for any extension of the mining work, yet in view of the present well warranted demand for expansion of such mining work, it seems advisable to secure from Congress specific authorization for these investigations. However, before considering the best means of providing for the new work in aid of the mining industry it is necessary to mention the lines along which extensions of federal work is requested. Especially is this important since there does not appear to be any concensus of opinion as to exactly what should be the scope of a new bureau or what shall be its relations to the existing organization. In fact some of those who have advocated further recognition of the mining interests have been unfamiliar with the work of the Geological Survey, and have not realized how closely its activities were related to the mining field. First among the kinds of mining work for which there has for many years been a steadily increasing demand, is the study of ore and mineral deposits. The work of the Geological Survey in the interests of the prospector and mining engineer has been appreciated throughout the mining communities. Two only of many cases of official recognition of the value of the Survey's work need be cited in this connection. The Legislature of Pennsylvania, the state which stands first in the value of its mineral products, provides for co-operation in geologic work with the federal survey, entrusting to the latter the expenditure of State money in the investigation and mapping of its mineral resources. The General Assembly of the State of Colorado, has twice, at least, expressed its appreciation of the Geological Survey. In 1879 in a memorial to Congress, presented by Senator Wolcott, this assembly petitioned Congress "to make generous provision for that branch of the United States Geological Survey which is engaged directly in examining metalliferous districts of the states and territories," and urged speedy publication of the results.

Ten years ago the statistics of mineral production collected by the Geological Survey were regarded as incomplete in that those of gold and silver were not included and a public demand was made for the inclusion of these statistics in the annual report of the mineral resources of the country. At present the collection of these has been authorized by Congress. The Survey's policy that the mining industry of the country is stimulated and guided by the distribution on the part of the Government of statistical and technical information has commended itself to the mining public generally and it has been well said that the distribution of knowledge is the one governmental activity which carries the largest probability of general benefit. Many authorities have emphasized the necessity of entrusting its statistical work to geologists, who not only can properly classify each year's production, but can measure the amount of the nation's reserve of mineral wealth.

There is another field in which the demand is actuated by real needs and this includes investigation into the methods of mining and metallurgy, especially with reference to the prevention of accidents and the better utilization of mineral products. Investigations already made along these lines by the Geological Survey show that this work lies well within the province of the Federal Government. Yet a large part of the field is as yet unoccupied and would include reports on the newest development in the various branches of the art and short summaries of mining and metallurgical methods for the use of prospectors and operators.

Many advocates of a Department or Bureau of Mines mention the need of federal inspection of mines. The inspection of mines except in the territories and the district of Alaska belongs essentially to the police regulations of the state authorities, so that in the absence of any federal law regulating the operations of mines there is no field for a system of mine inspection, regulation and supervision, except within the territories where this is already performed by inspectors who report to the Geological Survey. However, the publication of the results of investigations on this subject of mining methods and the nature of explosions in their relation to gas and dust in coal mines, the character of explosives and other subjects affecting the safety of mine employees and of mining property, constitute a duty which the Federal Government might and should assume through a scientific bureau.

The investigations of labor conditions in the mining industry and of the capitalization of mining corporations are functions delegated to mining bureaus in some foreign countries; but these are subjects that in the United States plainly belong to the appropriate bureaus of the Department of Commerce and Labor.

The expressed desire for free assays and analyses and for examinations of private mining property is complimentary to the character of the work performed by the various scientific bureaus of the Federal Government; but in my opinion this demand is for private and not public work, and can more properly be met by the private assayor and mining engineer as well as by the State mining bureaus and schools of mines, leaving for investigation by the Federal Government only the larger interstate and federal problems that are basal in character and important to the whole mineral industry. The investigations already carried on by the Geological Survey are of this type.

To recapitulate: Of these functions mentioned by advocates of extension of federal activity, two, namely, the study of mineral deposits and the collection of production statistics have been performed by the Geological Survey since it organization and the extent of such work has been limited only by the amount of public money appropriated; two others, namely, the investigation of mining technology and the supervision of federal mine inspection in the territories are now definitely provided for in the Survey organization—the scope of technologic work being as broad as is authorized by the terms of the appropriation; and of the remaining two, the investigation of labor and corporation conditions belongs to another Department, while the work of assays and examination of private mining property is more

properly the privilege of men in professional practice or of a state bureau than it is the duty of a federal bureau.

To meet the actual needs of the industry, the time is opportune for the enactment of well considered legislation and I submit herewith the draft of a resolution which in the opinion of myself and associates in the Survey, is adapted to accomplish the desired end. My purpose is to suggest legislation that will adequately provide for an increase in the mining work by the Federal Government without duplicating that already authorized. Some plans already presented for a bureau of mines have contemplated taking over much or nearly all the work of the Geological Survey; others have confined the proposed mining bureau's activities to the more purely technologic problems together with the statistical work.

It appears to me that there is only one true line of cleavage between these subjects, and this lies between the pure technology and those matters relating to the distribution, occurrence, origin and production of mineral deposits. Those who advocate the turning over to another organization the statistical work of the Survey have little comprehension of the true character of these investigations. As now carried on, this work embraces not only the tabulating of the statistical information, but also the discussion of the source of the materials themselves. It is true, that no other Government in the world is handling its statistics in this way, but the Geological Survey work has been often cited, especially in late years as the logical method of carrying on the work of mining statistics to meet the real needs of the mining industry. I need only mention the fact that in the case of Germany, universally recognized as a leader in the application of science to industry, the system of collecting mining statistics is being remodeled on lines acknowledged to be similar to those of the United States Geological Survey.

In my opinion, therefore, the whole question resolves itself into that of making adequate provision for the work now conducted by the Technologic Branch of the Geological Survey. These investigations have proved their value and their scope may well be expanded along technologic lines without duplicating or over-lapping the work of other branches of the Survey. On this subject the "Engineering and Mining Journal," under date of December 7th, stated editorially:—

"If a bureau of mines is to be established it is highly important to co-ordinate it with the Geological Survey, and the utmost care must be taken to see that the well-proved usefulness of the latter does not suffer. Indeed, it is almost inevitable that the Geological Survey and a bureau of mines must be conducted under one head, if efficiency and absence of friction are to be insured. In this respect the Canadian experience may profitably be studied."

On the basis of the historic development and present status of federal work in aid of the mining industry of the United States, the limitation of the function of any organization independent of the Survey to strictly technologic work is, in my opinion absolutely essential, if duplication of work and rivalry are to be avoided. To the same end I wish to place great emphasis upon the importance of having the name of the organization such as to express its functions and those along. The word "Mining" in itself would be inappropriate for investigations which form a part, only of those relating to mines and mining. With this in mind I submit herewith a draft of a joint resolution providing for the establishment of a Mining Technology Branch in the Geological Survey, the passage of which would constitute a decided gain in the expansion of the mining investigations by the federal government.

If, however, in the opinion of Congress, conditions are favorable for the realization of the proposition for an independent organization, it is my belief that the bill establishing such a bureau should provide not for a bureau of mining, but for a bureau of mining technology. I therefore submit the draft of a bill which provides for the establishment of an independent bureau to which the work now under the Technologic Branch of the Geological Survey could be transferred. Such a bureau would supplement along purely technologic lines the geologic work of the Survey in behalf of the mining industry.

In the event of the passage of the joint resolution first mentioned, my endeavor would be to so administer the added work as to promote the possibility of its ultimate establishment as an independent bureau whenever found advisable, while if the bill for the creation of a separate bureau should be enacted, the Geological Survey would co-operate with the Bureau of Mining Technology under your direction.

Very respectfully,

GEO. OTIS SMITH,

Director.

THE ENCHANTED ROD.

William Pryce, a Cornish physician, who lived in the latter part of the eighteenth century, was a firm believer in the mineral rod. There recently appeared in an English paper an account of Pryce's life and work.

It was the custom of the ancients to endeavor to procure the necessaries of life by the enchanted rod, and even to change the forms of things by the same instrument. There were many of Pryce's contemporaries who discredited the properties attributed to the rod, and he was indisposed to oppose singly the general opinion, though he was convinced of its absolute virtue—his reason being that his natural constitution of mind and body rendered him almost incapable of co-operating with its influences.

The uninitiated will be interested to learn that the enchanted rod is attracted by the metals with different degrees of strength in the following order:—(1) Gold, (2) copper, (3) Iron, (4) silver, (5) tin, (6) lead, (7) coal, (8) limestone, and springs of water. One method given by Pryce to determine the different attractions of the rod in this: Stand, holding the rod, with one foot advanced; put a guinea under that foot, and a half-penny under the other, and the rod will be drawn down; shift the pieces of money, and the rod will be drawn towards the face or backwards to the gold, which proves the gold to have the stronger attraction. By trying all the subjects of the rod in the same manner, their respective attractions in point of strength will be found to correspond, says Pryce, with the order in which he places them.

There may be a feeling abroad that the conjuring trick of the music-hall artist is an improvement on this, as he would cause the guinea pice to disappear entirely; but those who would experiment but for the likelihood of this untimely happening have no reprieve, for Pryce asserts that "it is advisable for young beginners to make no experiment, but about actual lodes, where the backs of them are known by the miners; or

else nigh the sea, where a lode being discovered they may trace it to the cliffs, and will be sure to find it.'' There is satisfaction, however, in the assurance by Pryce that a little practice by a person in earnest about it will soon give him the necessary adroitness in the use of the divining rod, and the stronger the grasp the livelier the rod moves, provided the grasp be steady and of an equal strength.

If a drawing room entertainment is cherished in the mind of the reader for pleasure and profit during the long, dreary nights of winter, it may lead to a measure of success if Pryce's naive instruction is borne in mind when operating the enchanted rod. He says: ''As our animal spirits are necessary to this process, so a man ought to hold the rod with the same indifference and inattention to, or reasoning about it or its effects, as he holds a fishing rod or a walking stick; for if the mind be occupied by doubts, reasoning, or any other operation that engages the animal spirits, it will divert their powers from being exerted in this process, in which their instrumentality is absolutely necessary; hence it is, that the rod constantly answers in the hands of peasants, women and children, who hold it simply without puzzling their minds with doubts and reasonings.''

GRAPHITE.

The Mines Branch, under the direction of Dr. Eugene Haanel, has issued recently a monograph on the mineral ''Graphite.'' This monograph is the work of Mr. Fritz Cirkel, of Montreal, and covers the subject from every point of view, including general information on the properties and geological occurrences of the mineral, its distribution in Canada; the mtehod and machinery used in its mining, dressing and milling. Description of the mines and dressing works of all the operating mines, the uses of the mineral in the arts, and notes on its occurrence in foreign countries. It is the fourth of a series of monographs on the economic minerals of Canada, and on account of the mass of practical information contained therein, it may be considered as a first class reference book, an aid to the practical miner, business man, and to the engineer. It is claimed that the book just issued is the only one in existence that treats the mineral from so many points of view. It is profusely illustrated, is acccompanied by 10 maps, and covers about 300 pages. In the introduction it is pointed out that on account of the great secrecy observed on the part of those who are engaged in the refining of the mineral, it has been very difficult to collect reliable data, and this might also account for the fact that there is so little published about this mineral.



Mill of the Buckingham Graphite Co.—Reconstructed by Mr. H. P. H. Brumell.

In this treatise special attention has been given to the Canadian graphite deposits, their geological occurrence, their distribution, their economic usefulness, with special reference to the different qualities of the mineral as found in this country.

Most of the graphite mines are found in the vicinity of Buckingham, Que., in the township of Buckingham and Lochabar, where now several mills of the most modern design are in operation. Investigations conducted both in the United States and abroad have demonstrated the great adaptability of the Canadian varieties for the manufacture of crucibles, and also for pencils. Canadian graphite in respect to combustibility can claim equality with the mineral now so largely used from Ceylon, while some varieties on account of their special physical qualities, and their exceedingly fine crystallization, are well adapted for the manufacture of pencils. The purity and uniformity of the crystalline, or flake, products gives the Canadian mineral first rank amongst lubricating graphites now offered in such large varieties and commanding the highest prices.

It is further stated that hitherto sufficient attention has not been paid to the exploitation of the large graphite resources, especially in the Province of Quebec. Graphite deposits lie unworked, which, as far as size, character of the occurrence, and quality of the mineral are concerned, compare very favorably with the great graphite resources of the Bohemian forests, where large



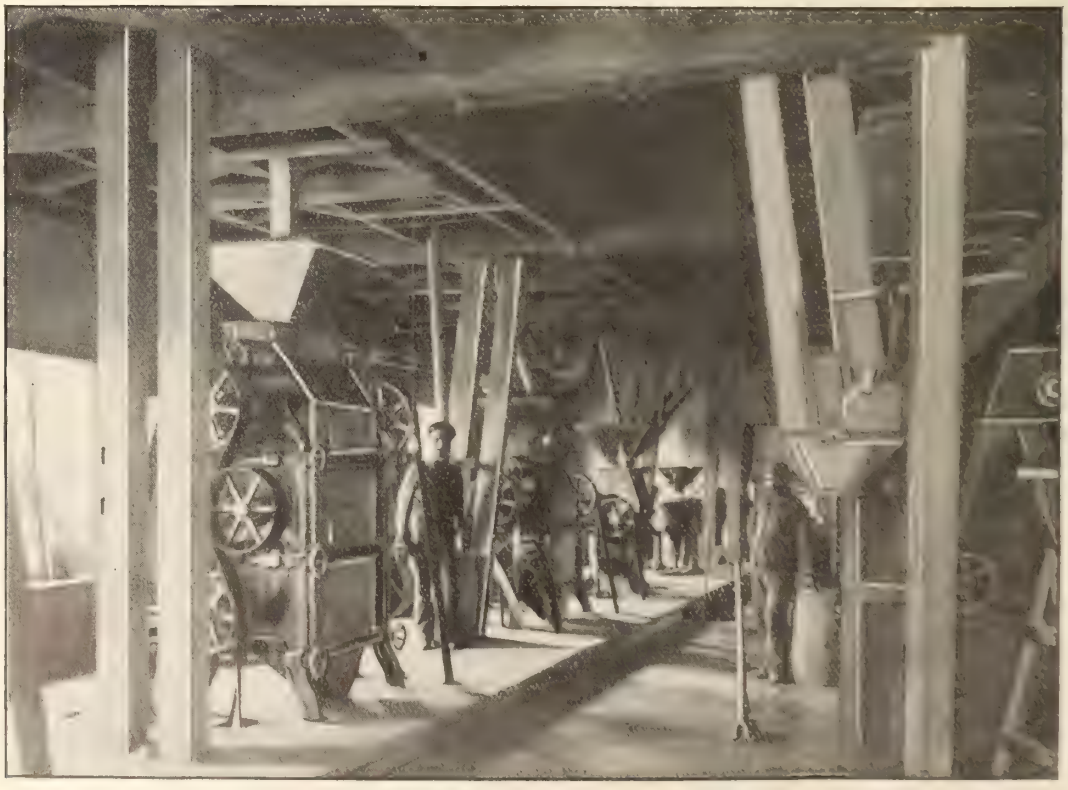
Large Outcrop of Graphite, Township of Buckingham.

well equipped mines and modern refineries are established.

Discoveries have been made in Labelle, Que., recently, and it is reported that some of these deposits, only partly developed, exhibit very large quantities of the purest mineral.

The report deals also with statistics and status of the industry, and we learn from the statistics presented that the value of the worlds total production of graphite for 1904 is placed at $4,343,691, to which Canada contributed only $23,745.

Of special interest is the chapter dealing with the qualities of graphite for commercial purposes. The author has taken great pains in going into this subject fully, consulting authorities both in the United States and abroad.



Interior View of North Elmsley Mill—Part of the Polishing Department.

Concerning the properties of graphite for pyrometric purposes, the writer says:—

1. In the application of graphite for pryometric purposes, that is as an addition to fire clay in crucibles, the quantitative determination of carbon, as well as of its components, is not essentiol. Neither a larger or smaller quantity of carbon, nor that of the admixture (to a certain degree) is an essential feature of the admixture.

2. It depends, however, primarily upon the quality of the accessory ingredients, and more particularly upon the proportion of the alumina to the fluxes.

3. The quality of the carbon, its greater or less incombustibility, is only of secondary importance. In equal or similar total proportions the quality of the carbon is decisive.

4. Chemical analysis as a rule is of the utmost importance and is in all cases a sure guide. If the analysis gives equal or compensating values, the practical criterion is the pyrometric test.

5. Both tests, the analytical as well as the pyrometric, should be made, however, in all cases for the sake of control, even if they are not always necessary. An agreement between the analytical and pyrometric results is the proof of accuracy.

For the manufacture of crucibles, it is essential that the graphite be almost free from all those components which render the latter less effective after admixture with fire clay in its resistance to high temperatures. In this connection it may be noted that graphite can be effectively replaced by retort coal or coke.

As to the adaptability of the Canadian graphite for pyrometric purposes and for the manufacture of pencils, it must be said that the highly crystalline character and the pureness of some varieties admits of its application for both purposes. Dr. Bischof, of Weisbaden, Germany, the well-known authority on fire resisting materials, has made a series of investigations with parcels of ore from the Black Donald mine, Renfrew county, and has compared them with the best Ceylon and Passau graphite, used generally in the manufacture of crucibles.

Dr. Bischoff comes to the conclusion that the Canadian flake graphite is at least equal, if not superior, to the best Ceylon graphite. This is confirmed by the investigation of Dr. Hoffman, of the Geological Survey, who has made also a number of tests with the Canadian and Ceylon varieties for the purpose of ascertaining their relative value as to combustibility.

Quite a number of experiences have also been made by the author in Nuremburg, the great centre of pencil manufacturing, with several parcels of Canadian graphite to determine its adaptability for the manufacture of pencils. These tests show without doubt that certain varieties on account of their exceedingly fine crystallization, if properly selected, produce pencils which compare favorably with some good grades made from the Bohemian graphite.

The graphite so employed by the author contained carbon ranging between 85 and 79 per cent., the carbonate of calcium and other soluble constituents having been extracted by the application of hydrochloric acid.

As Canadian flake graphite is so well known as a lubricant, it is not necessary to discuss its qualities for this application. It suffices to state that purity and uniformity of the flake, as now produced by the Canadian mill owners, give it first rank amongst the lubricating graphites now offered in such large variety. This is also shown by the fact that the Canadian article is amongst those that command at present the highest prices.



Western Drift Buckingham Graphite Company's Mine.

The subject of dressing and refining graphite has been treated as fully as possible, but the writer readily admits that this chapter, for lack of reliable data, is incomplete. Most of the graphite mill owners are reticent in giving information on the subject of refining. Indeed it must be said, that this is one of the industries on which not only is there hardly anything published, but it is difficult, if not impossible, to study the various mill schemes with the object of generalizations. Nearly every mill follows its own method, worked out and adapted to the peculiar characterissties of the ore, to meet the requirements and the exigencies of the market.

The writer therefore has confined himself to the enumeration and description of machinery for drying, crushing and concentration purposes. He has also summarized the principles upon which the separation of graphite from the gangue is based, with an outline of several mill schemes, which are in operation on the

American continent and in Europe; but he has not, for reasons just stated, gone into the description of special devices for the production of certain grades.

The book on "Graphite" will be welcomed by every practical miner, engineer and business man who has anything to do with this mineral.

The Mines Branch has spared no efforts to make this publication what it is really intended to be, viz., a reference book of the first order. Monographs of the character of the one just issued cannot but give a powerful stimulus to the development of the vast undeveloped mineral resources of the Dominion.

DETERMINATION OF MOLYBDENUM.

By J. C. Evans.[1]

The following method has for its object the determination of molybdenum in wulfenite or other ores containing lead. The procedure consists of getting the ore in solution by the proper reagents, the precipitation of the iron and lead as sulphides, the separation of molybdenum as sulphide and its molybdate, either gravimetrically. The method is detail is as follows:—

From 0.5 gram to 5.0 grams ore (depending on the amount of molybdenum contained, is attacked by hydrochloric acid; nitric acid is afterward added and the treatment with hot aqua regia continued until all soluble constituents of the ore are in solution; after one or two evaporations with nitric acid to expel all chlorides, the mixture is cooled, diluted with distilled water and a slight excess of ammonia added. Ammonia sulphide is added, drop by drop, and when all the iron, lead, etc., are converted into sulphides, a few cubic centimeters excess are added and, after stirring, the mixture is allowed to stand in a warm place until all the iron and lead sulphides have settled. It is then filtered and washed with a solution containing a slight amount of ammonia sulphide.

The precipiate is dissolved in a hot mixture of equal parts of nitric acid and bromine water, the iron and lead being reciprocated by ammonia and ammonia sulphide to insure the removal of all molybdenum. The combined filtrates, which show a deep brown color if much molybdenum is present are slightly acidified with hydrochloric acid and a rapid stream of hydrogen sulphide gas passed in for a few moments. Theoretically, the addition of hydrochloric acid alone will precipitate all the molybdenum as sulphide, but I have found that the passage of hydrogen sulphide is necessary for complete precipitation.

The molybdenum sulphide is filtered off and washed well with hot dilute hydrogen sulphide water. The precipitate is then rinsed into a No. 2 beaker and a few cubic centimeter of a hot mixture of nitric acid and bromine water poured onto the paper, receiving the acid and washings in the beaker containing the bulk of the molybdenum sulphide.

The mixture is boiled with frequent additions of bromine to oxidize the free sulphur and insure complete solution. From here one or two courses may be pursued:—

1. Gravimetric Method.—Any unoxidized sulphur is filtered and, after careful washing, ammonia is added just to neutralization, using litmus paper as an indicator. A few drops of acetic acid are added and then a slight excess of lead acetate, and the resulting lead molybdate, after stirring well and allowing to settle, is filtered through a tared Gooch crucible, or counterpoised filter paper as described by Blair[2], washed thoroughly with hot water and dried at 100 degrees C. to constant weight. The weight of the lead molybdate multiplied by 0.2614 equals weight of metallic molybdenum present, from which the percentage may be easily calculated.

2. Volumetric Method.—After the solution of the molybdenum sulphide, it is unnecessary to filter off any free sulphur present. The solution is almost neutralized with nitric acid, barely acidified with acetic acid, heated to boiling, and, while hot, titrated with a standard solution of lead acetate, using a dilute solution of tannic acid on a spot plate as an indicator. This is the well known method of molybdenum and is the exact reverse of the Alexander titration method for lead. The solution at first gives an intense yellow color when a drop of it is added to a drop of dilute tannic acid on a spot plate, and the addition of lead acetate is continued slowly until the yellow color just disappears. Knowing the standard strength of the lead acetate solution in terms of molybdenum present in the ore is easily calculated.

To prepare the solution of lead acetate, dissolve 15.70 grams of the chemical pure Merck salt (it has been my experience that other brands frequently contain chloride) in dilute acetic acid and make up to 1 liter. Twenty-five cubic centimeters of this solution is titrated against a standard solution of ammonia molybdate. The ammonium molbdate solution, having been standardized in terms of pure lead, shows the lead, contents of the of the lead acetate soultion, and the lead factor multiplied by 0.4640 gives the molybdenum value.

I have found this method more satisfactory than standardizing by means of molybdic acid, as it is very difficult to secure this reagent free from impurities, especially molybdates.

[1]Chief Chemist, Henry E. Wood & Company, Denver, Colo. Paper read before Colorado section West. Assoc. of Tech. Chem. & Met.

[2]"Chemical Analysis of Iron."

RESOLUTIONS OF THE ASSOCIATED BOARDS OF TRADE OF EASTERN B.C.

At the tenth annual meeting of the above association the following resolutions, amongst others, were passed unaminously:—

The resolution that a government assay office be established at Trail, adopted last year, was reiterated. The resolution also declares itself in favor of the Dominion Government purchasing gold and silver for coinage purposes at Trail in the same manner that the U. S. Government buys these metals at Seattle, Helena and elsewhere.

A resolution in favor of making relocations of mineral claims open for entry at noon on the day following the one on which rights of previous locators expire, was also passed. This is intended to stop the relocation of land and mineral claims at midnight. This was passed last year and reaffirmed this year.

A resolution was adopted stating that the railway freight tariffs, applying to the districts of Kootney and Boundary are higher than those applying to the rest of the Dominion and asking for a reduction from the railways, or, if necessary, from the Railway Commission.

Resolutions asking both the Dominion and Provincial Governments to establish experimental farms in the interior of the province were reaffirmed.

The most important resolution adopted was on the extension of the lead bounty, which is as follows:—

Resolved—That whereas: the lead bounty has, by insuring a stable minimum price, been most effective and beneficial to the lead mining industry and with it to the smelting and lead manufacturing industries, and, consequently, to the general commerce of the Dominion.

And whereas: such results have been produced by a relatively smaller expenditure than was anticipated when the original request for consideration was made to the Government, that out of $2,500,000 originally voted to be expended in the period of bounty, terminating 30th June next, but $616,976.02 has been expended up to the 1st December 1907.

And whereas: on account of the high tariff on lead ore and its products, still imposed by the United States Government (which it was anticipated might have been reduced ere this); of the recent imposition by said Government of a prohibitory duty on our zinc ores, a product of our lead bearing veins, thus deprived us of a source of revenue; and of the fact that the lead consuming capacity of Canada has not increased proportionately to our output, since the inception of the bounty, we shall, at the expiration of said bounty period, be still unable to rely on a stable minimum price for our lead, sufficient to justify its production in the form of ore, and the large expenditures on exploration and development work necessary to maintain our mines, and with them the entire lead industry of Canada;

And whereas: many of the larger lead mines of the district, either present or prospective producers, contain ore of so low a grade as to make its production impossible or improbable, during periods of low prices, it becomes necessary to extend the sliding scale, so that the bounty will be paid on lead when the price is £18, or lower, instead of £16, or lower, as at present.

Therefore, be it resolved that the Dominion Government be asked to extend the lead bounty for another period of five years, with the addition that the sliding scale be made to apply when lead is £18, or lower, instead of £16, or lower, as at present.

The next annual meeting of the Board will be held in Trail in the week following that in which the legislature meets.

GAS PRODUCER PLANTS AND GAS ENGINES.

EXPERIMENTAL WORK BY THE UNITED STATES GEOLOGICAL SURVEY.

The fuel consumed in the ordinary manufacturing plant operated by steam power yields less than 5 per cent. of its available energy in useful work. The superintendent of one of the most efficient steam plants in existence to-day estimates the total losses in a year's operation of the plant at about 90 per cent.—the utilized energy about 10 per cent. It is this wasteful consumption of our most important fuel, whose very existence, as measured by competent experts, is limited to a few hundred years, that has brought about the rapid development of one of the marvels of modern invention—the gas-producer and gas engine. It is estimated that a plant of this type, properly operated, will utilize more than 20 per cent. of the available energy in the fuel consumed.

The gas engine came into general use in the latter part of the nineteenth century, but large engines of this type have been constructed only during the last five or six years. Recent developments indicate that the replacement of steam engines by producer-gas plants is destined to be one of the two great factors in the economical production of power for manufacturing and transportation purposes—the other being centralization of power production and distribution.

For a long time the natural fuel of these internal-combustion engines was city gas, but that was too expensive except for engines of small capacity. Cheap gas was essential for the development of the engine, but the early attempts to produce it were somewhat discouraging. The theoretical possibilities of the internal-combustion engine operating on cheap fuel promised so much, however, that difficulties which semed almost insuperable have been overcome; and as a result of improvements in the production of cheap gas directly from fuel through the aid of the gas producer, the development of large-sized gas engines has been exceedingly rapid. Only seven years ago a 600-horse-power gas engine exhibited at the Paris Exposition was regarded as a wonder; to-day four cycle, twin-tandem, double-acting engines run as high as 6,000 horse-power.

In view of the possibility that the gas engine, with its gas producer, may displace the steam engine, the fuel problem became so important that the Government made special provision for producer-gas tests at its fuel-testing plant installed in connection with the Exposition at St. Louis. These tests have furnished valuable data on the relative consumption of coal per horse-power per hour when used by the steam plant and by the gas plant. By means of the producer-gas plant, which was installed in 1904, 162 tests have been made on bituminous coals, lignites, and peats from 26 States. The results of these tests, and a discussion of the present status of the producer-gas power plant in the United States, prepared by Mr. Robert Heywood Fernald, have been published by the United States Geological Survey in Bulletin No. 316, which forms Part II of "Contributions to Economic Geology, 1906."

All of the tests, whether on bituminous coal, lignite, or peat, were made in a producer of one size and type—a type designed primarily for use with anthracite coal—and with every coal that was run through the producer the results were more than satisfactory. Especially noteworthy is the fact that several low grade coals and lignites that have proved of little value or even worthless under the steam boiler gave excellent results in the gas producer.

About twenty companies in the United States are manufacturing gas producers for power purposes. At least twelve of these are fully established on a commercial basis and are in a position to give proper guarantees when installing plants, ranging in size from 20 to 6,000 horse-power, are now in operation in the United States. One company alone reports twenty-odd installations, averaging over 2,000 horse-power each, and nearly as many more, of about the same size, contracted for or now being erected. The number of installations and the persistent development has already led the National Board of Fire Underwriters to issue special rules and requirements for the "Construction, installation, and use of coal-gas producers (pressure and suction systems)." Of the total installations about two-thirds are suction plants, operating on anthracite coal, a few using charcoal. Bituminous coal is used in 15 to 20 per cent. of the plants installed, but this proportion probably covers 65 to 75 per cent. of the aggregate horse-power rating.

"The situation as a whole at the present time," says Mr. Fernald, "seems to be very favorable for the gas producer plant, not only as to cost of installation, operation and maintenance, but also as to reliability. The successful demonstration at the Government fuel-testing plant that bituminous coals, ligaites, and peats can be utilized with great economy in these plants should lead to an increase in the use of this form of power in a few years that may surpass even the most sanguine hopes of the manufacturers."

Of the centralization of power development and distribution Mr. Fernald says: "It would seem ridiculous to predict the immediate doom of the steam locomotive, yet one of the officials of the New York Central Railroad has publicly stated that within ten years, in his opinion, there will be no steam locomotives operating on the New York Central road. Already the New York Central has substituted electric for steam power on its lines from New York City to a point 40 miles from Grand Central station, and it is rumored that before long electric trains will be running on this road from New York to Buffalo . . . These rapid changes are leading to one end—the centralization of power development and distribution. Now that it is commercially possible to transmit electrical power for distances of 250 miles or more, a central plant could distribute such electric current for a distance of 500 miles—that is, for 250 miles on all sides of the plant—thus covering a circle comprising almost 200,000 square miles—an area nearly four times the size of the State of Illinois. The logical location of such plant is at or near the mines. With ten or twelve of these great central plants located at the various mining centres, the great railroads of the United States can send their trains speeding from the Atlantic to the Pacific coast; and the passengers, as well as the towns through which the trains pass, will be entirely freed form the usual annoyance of smoke and cinders, and the disastrous fires caused by sparks from locomotives will be a thing of the past."

UNITED STATES COAL MINING IN 1907.

Returns received by the Geological Survey indicate that the production of coal in the United States in 1907 amounted to between 450,000,000 and 460,000,000 short tons, an increase of about 10 per cent. over the record-breaking output of 1906.

The most signficant increase was made in the production of Pennsylvania anthracite, in which there was a gain of over 20 per cent. if the record of shipments as reported by the Bureau of Anthracite Coal Statistics may be accepted as indicative of the total production; and since the shipments amounted to more than 85 per cent. of the total production such an assumption is not unreasonable.

The shipments of anthracite in 1907 amounted to 67,109,393 long tons, against 55,698,595 long tons in 1906. This would indicate a total production for the year of appproximately 76,366,000 long tons, or 85,840,000 short tons. An interesting feature in connection with the production of anthracite in 1907, was the fact that no effect on the trade was produced by the panic that began in October and continued until the end of the year. Not only did the shipments of anthracite continue practically without interruption, but the records show that the shipments for November were larger than in any other November in the history of the trade, while those for October were the largest that have been made in any single month in the last four years. This record shows the extent to which anthracite has been eliminated from industrial uses, and indicates that pratically the entire production is consumed for domestic purposes.

Another interesting feature shown by the anthracite statistics for 1907, is the steadying influence of the policy adopted a few years ago by the coal-mining companies of discounting prices in the spring and summer months. The shipments (excluding a February of twenty-eight days) ranged from 5,249,946 long tons in January to 6,015,851 long tons in October, and the average monthly shipments were not quite 5,600,000 tons. This indicates that the mines were operated with remarkable steadiness month by month and that the transportation also was evenly distributed throughout the year.

There is no such reliable method of approximately computing the total production of bituminous coal as exists for anthracite, but letters received from a number of the larger operators and from State officials indicate that the total production of bituminous coal in 1907 exceeded that of the previous year by 7 to 10 per cent. The increases were rather unevenly distributed and were influenced by several causes. In the Eastern States where large quantities of bituminous coal are used in coke making and for other industrial purposes, the financial stress in the last three months of the year was pecularily felt, and in some districts was so pronounced that the increases recorded during the first nine months of the year were to a large extent wiped out. Had it not been for the disturbances in financial circles the production of bituminous coal in 1907 would probably have shown an increase almost comparable with the gain in anthracite production. It is almost certain that the increase in bituminous production would have amounted to 15 per cent. and that the total would have been between 390,000,000 and 400,000,000 short tons. As it is, the production will probably fall about 25,000,000 tons short of that figure.

During the first nine months of 1907 there was the same complaint of shortage of cars which has been made during the last few years, and owing also to the demand for and the high prices paid to labor in other lines of industry, there was a general scarcity of miners and other workers in the bituminous coal mining districts. AfterOctober there was a plentiful supply of both cars and labor. As compared with 1906, however, there was some improvement in transportation facilities, and those familiar with the trade realize that if a sufficient number of cars could have been furnished to meet the requirements of the producers, the production would soon have been far in excess of the demand, with the usual demoralization which such condition entails.

The coal-mining industry in both anthracite and bituminous circles was almost entirely free from labor troubles during 1907, both operators and miners, where the wage scales were signed with the union, showing a disposition to live up to contracts. An important gain made by the miners' union, known as the United Mine Workers of America, was the extension of its control to the majority of the larger producing mines in some of the States of the Rocky Mountain region. This change was effected about the first of September, at which time the hours per day in the mines which went under the union rules were reduced from 10 to 8, and in many of these mines the rate of wages was increased at the same time.

FOUR MEMORABLE DISASTERS.

In addition to the unsatisfactory conditions in the money market during the latter part of the year, the closing month was in another respect the darkest in the history of the coal-mniing industry, in that it recorded the occurrence of four separate disasters, all in the Appalachian bituminous coal field, and each attended by the sacrifice of many lives. On the first day of the month an explosion occurred at the Naomi mine of the United States Coal Company, near Pittsburg, Pa.; the second wrecked mines Nos. 6 and 8 of the Fairmont Coal Company, of Monongah, W. Va.; the third was an explosion of gas in the Yolande Coal & Coke Company's mine, at Yolande, Ala.; and the fourth wrecked the Darr mine of the Pittsburg Coal Company, near Connellsville, Pa. All of these explosions occurred within a period of three weeks, and in them between 600 and 800 lives were lost.

THE ENGINEERS' CLUB.

The Engineers' Club of Toronto invited a committee of the Toronto Branch of the Canadian Mining Institute to discuss with them the feasibility of securing and furnishing a suitable building to be used by both societies as a place of meeting. Mr. J. B. Tyrrell spoke for the Toronto members of the Canadian Mining Institute, as follows:

Mr. Chairman and Gentlemen.—

It is a great pleasure to me to have the opportunity of representing the Canadian Mining Institute here this evening, and of bringing from it to you kindliest greetings and best wishes for your welfare and success.

As engineers we are working along very similar lines. You install power plants, build bridges, railroads, tunnels, etc. We install power plants, sink shafts, drive tunnels, etc., and the principal differences between your tunnels and ours are that you must waste all the material extracted as cheaply as possible, while very often the material that is taken from our tunnels is too precious to be wasted, and must be carefully handled and stored. You want to build a tunnel that will last for all time, with just as few repairs as possible; we want to run tunnels that will last for the comparatively short time that we will need to use them, knowing that many of the arrangements necessary for great permanency would merely entail useless and unnecessary expense. You are able to lay out the plans of your tunnels before you drive them, while we may have to change our plans from day to day to suit the changing shape or conditions of the ore bodies. The mining engineer, perhaps more than any other class of engineers, must be constantly alive to the changes in the conditions that surround him, and must be always prepared to modify his plans to meet those changing conditions. However, he has one strong point in common with all other engineers, he is the man who does things, and does them along the lines that the though and practice of his predecessors through all past ages has shown to be most successful, adopting one plan here and another there as the necessities of the different parts of his enterprise may suggest to him. In his work, however, he probably deals more with raw ma extract from their hiding places in the rocks the useful ores and metals and hand them over to others to be treated in different ways, and transformed into the raw material than most of his confreres, for it is his duty to terial for other engineers.

But I wish to enter a protest against the definition of an engineer which has become rather popular within the last few months, namely, "The silent man who does things." For after all a silent man is a man but half developed. The highest class of engineer not only does things himself, but he teaches others to do things. He cannot claim to be a good citizen unless he is prepared and willing to impart to others some of the knowledge which he himself possesses. The teaching or communicating instinct is a part, and a valuable part, of our inheritance as human beings, and it cannot be ignored with impunity. Every right-minded man, be he engineer or not, feels quite plainly that this is the case, though he may not be accustomed to acknowledge it. He must impart to others something of what he knows.

Our clubs, where we are so fond of foregathering from time to time, distinctly point to the presence of this communicating instinct, for while most of us hope and expect to derive definite benefit from communion with others in these clubs, and this hope may probably be what we in this rather selfish age present to ourselves as the reason for our attendance, the real reason after all is that we have some little thing to tell to others which we would like them to hear and know, and we cannot be quite satisfied until we go and tell them. Now this Club and the Canadian Mining Institute are both formed for the purpose of enabling engineers, and those interested in engineering and mining work, to tell each other, and later as a rule the general public, some of the things that may seem interesting to the individual members. The strength of these societies depends on the mutual sympathy which the members have and show towards one another. There must be speakers as well as attentive listeners, and no man must be satisfied with occupying one role to the exclusion of the other.

In conclusion I would like to say that the Toronto Branch of the Canadian Mining Institute has had a most successful series of meetings so far this winter. They have been very fully attended, and the discussions have been animated and general, with plenty of good speeches, and many interested hearers.

I thank you, Mr. Chairman and gentlemen, on behalf of the Canadian Mining Institute, for the kind way in which you have drunk this toast.

EXCHANGES.

Mining and Scientific Press, February 1st.—In the January 4th issue of the *Mining and Scientific Press*, Mr. J. H. Curle's letter on the "Psychology of Mining Booms" appeared. Referring to thirteen mining booms of which he had had intimate knowledge, Mr. Curle remarked that after the initial excitement, outside promoters entered the field, capital poured in, and for one good mine twenty worthless ventures were floated. Then the inevitable crash and the equally inevitable loss and suffering of foolish and deluded people.

Mr. Claude Sachs, editor the *Mining Investor*, writes in the *Press* of February 1st a letter traversing Mr. Curle's statements and conclusions. Mr. Sachs attempts, cleverly enough, to justify "financial excitement, wide advertisment, speculation or optimism," as healthy and necessary concomitants of the discovery of one or two rich mines in a new district.

Mr. Sachs, as stated above, is editor of *The Mining Investor*, a weekly journal that publishes full page advertisements of mining stocks of the "get rich quick" variety. It is therefore not surprising that Mr. Sachs is

guilty of more than one sophism. His is the *argumentum ab inconvenienti.*

Mining Science, January 30th.—A convenient classification of various sizes of ore particles is given by Edwin A. Sperry in an article on slime concentration, written for *Mining Science.* "Coarse" is defined as material remaining in a screen having 30 meshes to a linear inch (0.02 inch or 0.5 m.m. open space; "sands," as material passing 30-mesh and remaining in 100-mesh (0.004 inch or 0.1 m.m. open space); "fines," as material passing 100-mesh and remaining on 200-mesh or 0.05 mm. open space); and "slimes," as material passing 200-mesh.

The Mining World, February 8th.—An article entitled "The Prevention of Coal Mine Explosions," by Carl Schulz and R. S. Moss, includes a brief analysis of the possible conditions pre-requisite to an explosive atmosphere. After reviewing the causes that "alone or combined, may create a dangerous accumulation of gas and coal dust," the writers affirm that "in all these cases prevention can be assisted only by the use of locked safety lamps, a proper degree of care, and intelligence, exercised by everyone employed in the mine."

In spite of an abundant timber supply and roofs of moderate height, by far the greatest number of accidents are due to roof falls. Carelessness and extravagant use of explosives are to be blamed for this. The practice of shooting off the solid instead of first undercutting the coal is dangerous and wasteful of powder.

Close observation points to the fact that a humid atmosphere is the best preventive of the accumulation of coal dust. Hence finely atomized water should be sprayed in the ventilating current. This accomplishes much more than mere sprinkling of the floor.

Explosions generally happen on days following the period of idleness and especially on Monday.

The Engineering Magazine, February.—In this issue of our valuable contemporary appears a review of the Nevada copper fields by Mr. A. Selwyn-Brown. Mr. Brown's outline of the geology of these districts is worthy of notice.

The copper industry of Nevada is growing with such rapidity that before long that State will rank amongst the largest producers on the continent. New plants are going up in many places, and within a few years will be enormously increased.

The most remarkable feature of the geology of Nevada is the evidence of volcanic activity everywhere visible. Volcanic sheets, intrusive dikes, ruins of volcanic craters, gigantic fissures and immense beds of sinter and volcanic ashes are the present indications of former volcanic activities. Many of the best authorities agree that one vast petrographic province, underlain by a single body of molten magma, stretches from Alaska through British Columbia, Idaho, Nevada, Arizona and Mexico, down into the Andean regions of South America.

The general sequence of lavas in Nevada is: (1) Rhyolite (Eocene). (2) Andesite (Miocene). (3) Rhyolite and basalt (Miocene-Pliocene). Andesite (Late Pliocene—early Pleistocene). (5) Basalts and occasional rhyolites (Pleistocene). Accompanying this petrographical province is a co-extensive metallographic province in which many rich ore deposits, almost identical geologically, occur. Illustrating this is the striking geological and mineralogical similarity between the ore deposits of the Comstock, Tonopah and De Lamar, and those at Guanajuato, Pachuca, and other Mexican districts.

PERSONAL AND GENERAL.

Mr. Thomas J. Drummond, of Montreal, returned early this month from an English trip.

Mr. S. G. Blaylock, formerly of the Hall Mines smelter, has gone to the St. Eugene mine at Moyie.

Mr. Harry E. Rice succeeds Mr. J. F. Kent as superintendent of mills of the Dominion Iron & Steel Company, Sydney, N.S.

Mr. W. H. Aldridge, general manager of the Canadian Consolidated Mining & Smelting Company, is visiting Toronto and Montreal.

Dr. John Galbraith, Principal of the School of Practical Science, Toronto, has been elected president of the Canadian Society of Civil Engineers.

Captain John Harris, superintendent of the McKinley-Darragh mine, has resigned. Under his management the McKinley-Darragh made notable progress.

Major Vereker is inspecting gold properties in the Manitou Lake district, and will shortly leave for England in connection with his investments there.

Mr. Alexander H. Smith, of Oaxaca, Mexico, is visiting Toronto. Mr. Smith is the manager of Los Reyes gold mine, near Oaxaca. He will remain in Toronto for some days.

Mr. G. C. Mackenzie has made an inspection of the blast furnace of the Atikokan Iron Company, Port Arthur, and their iron mine at Atikokan, for the Ontario Bureau of Mines.

Mr. J. F. Kent, formerly superintendent of the mills of the Dominion Steel Company, has severed his connection with the company. He is succeeded by Mr. Harry E. Rice.

Capt. McClelland, of Winnipeg, and Mr. Michael Ralph, of Port Arthur, have returned from an exploration trip near the shores of Lake Nepigon, where they claimed to have discovered large deposits of red hematite ore.

Mr. Louis Ernest, an engineer who was for some time engaged in developing mining properties in British Columbia, has been declared bankrupt in London, England, an examination into his affairs showing a deficiency of £2,522.

Mr. E. Jacobs, the newly appointed secretary of the Western Branch of the Canadian Mining Institute, and Editor of the British Columbia *Mining Record,* is doing good organization work in Northport, Greenwood and other Boundary points.

The death of Col. Brownell-Granger, formerly manager of the Coxheath Copper Mining Company, at Beechmont, near Sydney, N.S., occurred on the 24th of January. He was a native of Boston and had been in Sydney for about 20 years. He was 76 years of age.

Mr. Alex. Dick, it has been announced, will remain with the Dominion Coal Company as general sales agent. Mr. Dick's headquarters will be removed to Montreal. We are glad to note that Mr. Dick's services will be retained by his company. He is one of the best informed and most effective general sales agents in the business. He has made a close study of market and economic conditions both in America and Europe.

Negotiations are now in progress between the De Beers Consolidated Mines, Limited, and Premier Diamond Mining Company, looking toward a restoration of confidence in the diamond market. Profits of the Premier Company for 1907 are stated to be about £550,000. As a result of the reaction in the diamond trade about 4,500 diamond workers, or one-fourth of the total number in Amsterdam are out of employment.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The new rate schedule which the Coal Company announced would go into effect on the 6th of January, became operative without giving rise to much comment, and to-day the men have received their first fortnight's pay under the new order. The Coal Company went a little further than they announced in their Schedule No. 1, and have given an increase to landing tenders and drivers as well as the general shift labor increase. The Coal Company in their reply to the Minister of Labor took exception to the application of the P.W.A. for a Board of Investigation and Conciliation under the Lemieux Act, or to give it the full title, the Industrial Disputes Act 1907, pointing out that the declaration which accompaniel the application did not state that authority had been obtained by a majority vote of the workmen to declare a strike in case the application was refused, that eighteen lodges only of the P.W.A. were interested parties to the dispute, namely the lodges of the workmen of the Dominion Coal Company affected by the new rates, whereas the application was made in the name of the P.W.A. as a whole, which was not a party to the dispute. The company also claimed that the application of the P.W.A. was a misstatement of the facts, inasmuch as it referred to decrease to certain classes under the new schedule, but omitted any reference to the compensating increases to other classes under the same schedule, and that in fact the new scheme of rates involved an aggregate increase on the Coal Company's payroll. Under these circumstances the Government refused the application as first drafted, whereupon the P.W.A. took steps towards the prepraation of another application. They held a series of meetings of all the lodges and passed a resolution declaring their intention to strike if the the application were not granted. The Minister has now decided to grant the Board of Conciliation applied for by the P.W.A., and has communicated with the Coal Company as to their choice of a representative on the Board. At the time of writing the Coal Company have not announced their nominee. This is the first time that the Lemieux Act has been called upon to deal with a serious industrial situation. Up to the present time the disputes that have been settled by the intervention of the Department of Labor have been small and comparatively easy to adjust. The present matter, however, affects not only the welfare of about 6,000 men directly connected with the Coal Company at Glace Bay, but also the neighboring City of Sydney, and further than that it will prejudicially affect the whole Dominion from Montreal to the sea, if any cessation of work takes place. It is difficult to see why any such action was necessary, as had been taken by the P.W.A. At a time when industrial conditions over the whole of this continent are under a cloud, when banking establishments whose names were a synonym of stability have gone to the wall, when the mines of the United States have been closed for want of demand, when a cycle of industrial depression appears to have set in both here and in Eurpoe, the men were offered a continuation of the rates and conditions that have proven so satisfactory during a period of three years, and to use a slang phrase "they turned it down." Not only so, but they made most impossible demands, demands in fact, the granting of which was out of the question. They asked that all miners out of places should be paid a minimum wage $2.44 per day, and that extra tonnage rates should be paid for night work, two things, that so far as we know, are not existent in any mine anywhere. The men asked for an increase to the more poorly paid common laborer, and in doing so they played largely to the gallery. Persons not acquainted with the conditions around the mines would say at first blush that such a demand was eminently reasonable, and that under the present conditions of living $1.38 was not a living wage for men with families to support. But as a matter of fact, the number of men with families to support on $1.38 was practically a negligible one, and no really able bodied man need work for that wage. The truth is that the $1.38 rate was paid to drivers, boys and old men past work, really pensioners. In addition to these classes there are always men who are willing to earn a small wage on the surface, at a comparatively light job, than to earn bigger wages underground and work harder for it. The work for which $1.38 was paid is not worth any more, and the company have shown their views on this point by refusing to raise wages for work of this kind. Instead they have raised the wages of the mechanics and the $1.65 man or the skilled underground shiftman. In Schedule No. 2, which carried with it the acceptance of a three years' contract, the company offered their men as attractive an adjustment of wages and as equitable a one as any Board of Conciliation could possibly evolve. The management of the Coal Company being cognisant of the extraordinary divergences in the scale of remuneration for different classes of work in their mines, and of the disasterous effect on their general organization that these divergences were having, took the opportunity offered to them by the action of the P.W.A., and deliberately set to work to draw up a set of rates that should abolish the inequalities existent under the old conditions, and a schedule that should fairly distribute the aggregate payroll, which the company under Schedule No. 2 were prepared to increase by about $60,000 per annum. This proposition also the men "turned down," stating that under no circumstances would they sign a contract. Quite why they should so shy at a contract after the reassuring experience of the past Three Years' Contract, is not apparent. They appear to look upon a proposal of a contract as an attempt to enslave them for a period of time, which seems a very perverse and wrongheaded way of regarding the matter. The conditions under which the Dominion Coal Company operate are peculair and not paralleled anywhere. They have a vast market, which they must defend against the encroachments of the American mines, and they have only a limited season in which to ship their coal supplies to the St. Lawrence to feed this territory. It is necessary in order to keep abreast of their orders that large sums of money should be expended on mine development and that their plans should be very carefully prepared a long time in advance. All these considerations render it not only desirable, but almost imperative, that the management of the Coal Company should seek in some way to assure themselves long seasons of settled conditions as a necessary corollary of their constant growth, and this is their principal object in asking their workmen for long term wage contracts. Looking at the matter also from the workmen's point of view it does not seem to their disadvantage that in face of a falling market and after a long wave of industrial prosperity, that seems likely to be followed by the trough of depression, they should be asked to agree to a settled three years of such favorable conditions as would be assured under Schedule No. 2. It would appear to those who have given the matter attention that the work of a Board of Investigation is superfluous, but a Board of Conciliation which performed its proper functions should not have a hard task before it. As we understand the Lemieux Act, it is in no wise an enactment call for the compulsory arbitration of trades disputes, and we do not see that any Government can pass such an enactment, but is is an enactment which provides an easy and recognized method of bringing into a dispute between employer and workmen the dispassionate influence of a third party with a view to conciliation, and conciliation only.

Glace Bay, 1st February, 1908.

The weather in Cape Breton throughout January was unseasonably mild and there was only one snowstorm of any consequence. Partly from this cause and partly owing to the steady work put

in by the men, outputs have been high. The output of the Dominion Coal Company, was 312,000 tons, which is considerably higher than anything that has ever been done before in January. The next highest January output was obtained in 1903, when the production of the collieries was 270,000 tons. In consequence of the good time worked and the increase on the Coal Company's rates the money disbursed through the payrolls will be very much larger than in previous years, which in the present depressed state of trade is very gratifying. Indications point to a continuation of the same conditions throughout Febraury.

When one contrasts this plenitude of work and wages with the conditions that obtained before the advent of Dominion Coal it must be admitted, the public grudge against all corporations notwithstanding, that the proof of the pudding is in the eating. This equalization of outputs is only obtainable by means of a wide-reaching and perfect organization, and when one thinks of the results, namely, good work, excellent wages and a reasonable selling price for coal, compared with the feasts and famines and the general undependability of things under the old regime, perhaps it may be conceded that good may come even out of Nazareth. We do not know of any other place where better and more consistently steady work the year round can be obtained by the man who wants work of this kind, than in the employment of the Dominion Coal Company and its neighbor, the Nova Scotia Steel & Coal Company. This statement is made advisedly and can be proved. Considering the tricks that nature plays us down here every winter and spring the achievement of such equalized conditions is most notable, and shows how far concentrated and skilfully directed human energy can maintain a more or less successful conflict with our northern climate.

Springhill.

The third Conciliation Board met on the 7th inst., and sat four days. Very little interest was taken in the proceedings by the workmen, and none at all by the management, no member of which attended in any capacity. Any of the workmen who had anything to say were permitted to say it without opposition. The subject brought up for discussion was first:—The Weigh Scales, second:—The schedule of Rates in mine, third:—The Stone question. The first was unnecessary. The second was impossible, and the third had been handled by a previously legally appointed Board. It must be said that the Labor Department did not show up very well in the formation of the Board, and convinced the large majority of the workmen who were sincere in their wish to reconcile the contestants, that more diplomacy ought to be used in this particular, even if a Board at the juncture was legal, or necessary, which many thought it was not. The men applied for the Board of Conciliation, and appointed as their agent R. B. Murray, a local magistrate. When the company was notified of the application by the Labor Department, the Company found that the subject of dispute, or the principal subject at least, had been decided by a previous Board. Therefore they refused to have anything to do with it, and this front they maintained. They also, of course, refused to appoint a man for the Board. The Government hereupon appointed a man. This man had refused to act on a previous Board, but under orders, consented. He met with the workmen's agent to select a Chairman, or third party. The men's agent proposed a former Chairman, but the Government appointee objected and proposed a judge of the province, and a man whose integrity, impartiality and legal ability were recognized throughout the Dominion. The men's agent objected. The Department slipped in then and appointed the nominee of the workmen's agent. Thus was the Conciliation Board brought into being. Neither the men nor management seem to lose any sleep over the probable outcome of the investigation, which lasted four days, a portion of which was conducted behind closed doors. The company as before remaked, took no part or interest in it, and appear absolutely indifferent to the ultimate finding of the Board.

The Stone Question.

This stone case is a serious one, only on account of the hold it gives the agitators on the miners who compose, after all, but a small portion of the working force. Few among the miners today but know that the question was settled years ago, and the opening up of the question could only be the result of the ignorance of strange miners, and agitators, while those amongst the miners who really knew, would naturally stand aloof ready to take advantage of any success, the agitators would meet with. The efforts of these agitators were, however, rendered nil by the evidence of men and officials who had participated in the settlement of the Stone Question 17 years ago. The consequence was the former Board decided against the workmen. But if the malcontents could not control that Board, they certainly had control of the workmen, and a strike of three months ensued, in which everybody suffered but the agitators as subsequent events seemed to prove. The men finally accepted defeat and conditions that should have rendered further Boards unnecessary. The sapient leaders did not think so, however, hence the third reference. The finding of this has just been made public.

Work in the Springhill Collieries is very steady, the mines have their full complement of men.

Labor is abundant at the mines and the people connected with the Springhill Collieries are fortunate in having steady work when hordes of men are absolutely starving or working for the bare necessaries of life, in many parts of Canada.

When will working men recognize the fact that it is sheer suicide to strike on a falling market! Here we have several of the largest coal mines in Canada, talking strike with the probability of hundreds of men being thrown out of employment in Nova Scotia, with thousands of unemployed in other sections of the Dominion, who would be only too glad to earn a tithe of the wage, with the steady work, with which these miners are favored.

The Scales.

In the case of the scales, an urgent demand by the committee of the local lodge, supposed to emanate from the body of the workmen (which it was subsequently found was not the case) was made on the management to install scales for the weighing of coal at the several bankheads. This was promptly complied with by the management now that a bona fide and apparently general request had been made. When work was resumed after the strike the workmen's checkweighmen was asked by the manager to act in conjunction with the officials, in arriving at a standard weight per box. There were some difference at the time between the checkweighmen and their employers as to extra remuneration for the increased labor and responsibility connected with the new system. This the workmen refused. From this or some other cause the checks would not act in the case. The management thereupon put on sworn weighers from another town and after 10 days work under usual conditions, they arrived at a fair and equitable standard. The modus operandi was published in the local papers, and the public, and workmen generally, were satisfied that the new method was fair.

The Schedule Case.

The request for a schedule of rates was as promptly complied with by the management as the demand for the scales. A joint meeting of the officials and a large committee composed of the officers of the P.W.A. met and drew up a schedule of existing rates, satisfactory to both parties. It was found later, however, that the committee could do nothing definite till they had consulted the lodge. The lodge members took up the matter and made up a schedule to suit themselves. This was handed back to the management for signature, and after being read over by the officials, was

found to embrace all points of former disputes, and read in favor of the men. A comparison of the schedule agreed to by the officials and committe, differed so materially with the one presented by the lodge that the management dropped the question of schedule at once, possibly for all time.

ONTARIO.

COBALT.

Silver Cross.—This property is considered one of the best prospects in the Camp, and with proper development has a good chance of proving to be a shipper. Shaft No. 2 is now down 25 feet, the vein which is smaltite, niccolite and calcite, averages 4 inches in width and carries small silver values. It is the intention of the management to sink 100 feet and cross-cut to No. 1 vein, which is located about 300 feet to the north. The property is equipped with a small plant sufficient for prospecting work.

Silver Cliff.—This property, which is the first to be added to the shippers of 1908, is suited north of and adjoining the Watts Mine on the shore of Cross Lake. On January 20th, twenty-six tons of ore were shipped. The values consist chiefly of leaf silver in the wall rock. The formation is diabase with a Keewatin contact.

Cobalt Central.—On January 30th a new ore shoot, carrying high values, was encountered 97 feet in the drift on the second level on No. 2 vein. When struck, the vein was 4 to 5 inches wide, within a few feet it widened out to about 12 inches, about 3 inches of which is smaltite, carrying approximately 2,500 ounces and the balance calcite, carrying about 200 ounces.

The concentrator continues to give very satisfactory results.

Cobalt Lake.—The vein known as the "niccolite vein" continues to show very good silver values. The vein was encountered at the 86-foot level, in a drift north from No. 4 vein. On the surface the vein was practically all niccolite, at the 86-foot level it is largely smaltite. In a raise in the east drift on this vein silver was found. The fact that high silver contents were proven on this vein is especially important as the vein averages over two feet in width.

The annual meeting of the company will be held at Toronto on February 21st.

Cleveland Cobalt.—F. L. Cody, secretary and treasury of the Rochester Cobalt Mines Company, has been made manager of this mine. 20 men are now employed on the property of the company at Clear Lake and a small force at the power house, in the town of Cobalt.

City of Cobalt.—One ton of high grade ore and one ton of low grade ore from this mine, will be sent to the Electric Smelter at Ottawa. This ore has been ground to a quarter inch mesh and sampled here. The results will be watched with great interest. The drifts at the 145 foot level are now in 26 feet each way from the shaft.

T. & H. B.—The employees at this mine were notified of a reduction in wages in December. The union applied for a Board of Investigation, which is now sitting.

Badger.—The shaft on the No. 5 vein, which is now 110 feet, will be continued on to the 150-foot level. The shaft on the No. 9 vein is down 60 feet and will be continued to the 100-foot level. This is being sunk on a good showing of smaltite. 35 men are employed.

Right of Way.—In cross cutting west, at the 75-foot level, in the No. 1 shaft, a new vein was cut at a distance of 20 feet from the shaft. This new vein is very rich indeed, carrying smaltite, niccolite and native silver. It runs parallel to the vein sunk upon.

No. 2 shaft is down 160 feet and the cross cut west, at the 85-foot level, to cut the vein, in is 65 feet.

Montreal River District.—There have been several discoveries, recently, of importance in this district. In lot 4, concession 6, James Township, all six of the Prince claims have been passed on sight.

In the Silver Lake section, six miles west of Elk Lake, four out of five of the Clinton claims have been passed on native silver discovery.

On the Downey claim, in the same section, silver was struck at 32 feet depth, in a vein of calite, bornite and chalcopyrite, about six inches wide.

Two finds of importance were made early in January in Smythe Township.

At Elk City over 150 lots have been sold and a number of substantial buildings built. Orders have been placed for 250,000 feet of lumber to be used in construction during the spring and summer.

Temagami Mining & Milling Company.—The "Big Dan" Mine, belonging to this company, at Grey, has about 35 men at work. The two shafts are each down 60 feet and a tunnel driven in on the vein is in 100 feet. The ore, which is an auriferous mispickel, is being shipped to New York for export.

Coniagas.—A shaft house will be erected shortly at the No. 2 shaft. This will be the main shaft. A self dumping skip will be installed and the ore hoisted will be dumped into a chute, which will carry it directly to the crusher at the mill. This shaft is now down 160 feet. 116 men are employed.

Trethewey.—There are four carloads of ore ready for shipment. The last lot shipped averaged 3,000 ounces to the ton. 55 men are employed.

14,500 tons of ore were shipped from Cobalt in 1907, which carried approximately 90,00,000 ounces of silver. This is 5 per cent. of the world's production, 16 per cent. of the production of the United States and 77 per cent of the production of the State of Colorado. Figuring 9,000,000 ounces at 65.3 cents, the average price for 1907, the value of the Camp's output was something over $5,877,000, considerably more than the total value of the production for the first three years in the history of the Camp.

Red Rock.—At the annual meeting, the directors voted to expend $2,00 per month on development work on the property of the company, which is situated south of and adjoining the Green Meehan.

Kerr Lake Crown Reserve.—10 tons of some of the richest ore that the Camp has produced, are ready for shipment to New Jersey.

Temiskaming.—While drifting on the main vein at the 200-foot level, a cross vein of calite and native silver was encountered. This new vein is two feet in width and carries an estimated value of 5,000 ounces to the ton.

Little Nipissing.—This company has leased from the Peterson Lake Mining Company, 10 acres on the west side of the lake adjoining the Nipissing Mine. The lease is for five years, the lessees agreeing to pay 25 per cent. royalty on all ore produced, to do 350 feet of underground development work the first year and 500 feet per year, thereafter, during the life of the lease.

O'Brien Mine.—A cheque for $7,327.75 has been paid to the Provincial Treasury for the 25 per cent. royalty for the month of December, 1907. This makes a total of $230,272, which the Province of Ontario has received from the O'Brien Mine in a little more than a year.

Silver Leaf.—A car of 31 tons of high grade ore was shipped from this mine on January 28th.

The shaft on the new vein is now down 60 feet. 33 men are employed and three drills.

There are 15 tons of high grade and 3 cars of screenings in the ore house.

McKinley-Darragh.—A small force of men are now employed at the Savage Mine, belonging to the McKingley-Darragh Savage Company. The shaft is now down 113 feet, will be sunk to 125 feet and cross cut run south. The stamp mill at the McKinley-Darragh has been closed down for the time being.

There were eight shippers in the week ending January 31st, with a total of 12 cars of ore shipped, 80 per cent. of this ore went to the Canadian smelters, practically a reversal of the average of 1907, in which year the Canadian smelters treated about 20 per cent. of the output of the camp.

In the month ending January 31st, 1,326 tons were shipped, 346 tons more than in January, 1907.

BRITISH COLUMBIA.

Boundary.

Feb. 3.—No marked advance has been made in mining in this district during the past few weeks outside of that shown by the Granby Company in the Boundary, who have gradually increased their output until they are now running their full battery of eight furnaces at the smelter and for the week ended January 31st shipped 22,011 tons of ore from the mines. Granby are now employing over 800 men at the mines and smelter, but there are still from 50 to 75 men applying at the mines daily for work. It requires two trains per day to haul the output of the Granby Mines from Phoenix to the smelter at Grand Forks; one C. P. R. train of about 32 cars and a G. N. R. train of 38 to 40 cars, and the company ships a car of blister copper to the Eastern refineries nearly every day. The recently installed electrical haulage equipment in the lower levels of the Victoria shaft is now about ready to be put into operation.

Rumors are rife in the Boundary anent the absorption of B. C. Copper and Dominion Copper interests by Granby. Color has been given this gossip by recent examinations of the holdings of these companies by Granby men. While the Granby officers maintain that there is nothing to this talk at the present time, yet to any one in touch with mining affairs in the Boundary, the move seems feasible to a degree, for it is a well known fact that the Granby Company have been making copper very much cheaper than the B. C. Copper Company, and 3 1-2 cents per pound cheaper than the last year of the Dominion Copper Company, and no doubt with proper arrangements and plans they could handle the products of the mines of these companies and make them pay well, even with copper at its present low price. But there are a great many threads that will have to be gathered up before a deal like this could be made, and unless copper remains at a very low figure for a long time it is doubtful if the thing would go through. However, it is clear that if an arrangement of this kind did come to pass it would certainly be a money making proposition for the shareholders. It is also understood that the Consolidated Company has its eye on the Dominion Copper outfit. Inasmuch as the Consolidated is now handling at its well equipped smelter at Trail, ore from the Snowshoe Mines, which is said to average 1.4 per cent. copper, $1.50 gold and 23 cents silver, it is reasonable to assume that they could handle the ore from the Sunset, Idaho and other Dominion Copper Company mines, at a profit. All of the progressive companies in this district are now extending their operations over a broad field, for instance, Granby, among other things are working in the Similkameen and at Rossland; Consolidated at Rossland, Phoenix, Trail, Moyie and the Slocan; Le Roi Two at Rossland and Slocan and so on. This is necessitated by the low grade of the gold-copper ore as it is necessary to have a higher grade ore mixed with it for fluxing purposes, and it tends to more economical operation.

Nothing was done at the annual meeting of the Dominion Copper Company, January 27th, towards resuming work and unless the price of copper, cost of coke and supplies and other factors adjust themselves nicely, it is hardly possible that B. C. Copper Company will start work right away. The net profits of the B. C. Copper Company for their last fiscal year were approximately $700,000, while those of the Dominion Copper Company were about $80,182.

The Maple Leaf group of claims, near Grand Forks, has been bonded to New York people, and work has been resumed.

Rossland.

The Consolidated Company is opening up a fine lot of ore in their Centre Star-War Eagle, Idaho and Iron Mask workings. In the lower levels of the War Eagle they have encountered ore running high in gold values, a 100 ton lot averaged $50 per ton in gold. One ore body on the 14th level has been cros cut for 65 feet and a drift from the 11th level of Centre Star into the Idaho has cut a 35 foot ore body in the latter.

At the Giant-California the development work is reaching a satisfactory stage and test shipments will shortly be made from the Old Giant ore shoot, which has been reopened. Mr. W. Y. Williams, consulting engineer for Granby, examines the workings periodically and expresses his opinion that the property will develop into a mine in good time.

At Le Roi Mine affairs have gone ahead as usual and the mine is looking very well. They are keeping the Spitzee Mine free of water pending the arrival of Mr. Carlyle, now consulting engineer. The recent discussion which the directors had in London, Eng., over their salaries has caused some comment here. It is thought that this is an unpropitious time for the directors of Le Roi to talk salary, in the first place and it is generallyl conceded that the London office is a big burden on the mine, in the second place. The directors instead of making it harder for the people at this end, should do all they can to assist in the work of making the mine pay.

The lessees of the Blue Bird Mine here, have uncovered a silver-lead ore body on that property from which a car of ore has been taken averaging $50 to the ton; the car contained 20 tons and the returns to the lessees were $45 per ton, after freight and treatment charges had been paid.

Slocan—E. Kootenay.

The Hewitt Mines, near Silverton, are planning to build another tramway to facilitate their mining, and recently shipped five cars of ore which averaged 141.6 ounces silver and 5 per cent lead. They have enough concentrating ore blocked out to keep the mil running for two years. The Vancouver, Wakefield and Standard are also shipping, and the output from Silverton district is now about 1,000 tons per week. The Eureka, emulating the example of Rambler-Cariboo and Krao are going to drive a long tunnel which will tap their ore bodies at depth and do away with pumping water. When the showing warrants it, there is no doubt but this the most economical method, where it can be practiced.

The Eva Company have completed plans to resume work on a larger scale. The Silver Cup is looking well. The Queen, Second Relief and other properties in Sheep Creek district are active. Mr. Waldie of the Queen having made a success so far of his work, it has encouraged others to put money into their properties.

Crow's Nest.

The B. C. Associated Boards of Trade, assembled at Movie, recently passed a resolution favoring the renewal of the bounty on lead. The Boards of Trade are keeping up the agitation of this laudable piece of work and delegates have been sent East to present the case to the Government in a proper manner. The

Associated Boards of Trade also recommended that the Government establish an assay office at Trail, and purchase the gold and silver for coinage purposes from the Trail Refinery." There is not much doubt but what the latter recommendation will be complied with, while the others deserve serious attention.

At the second annual meeting of the Crown C. & C. Company, held at Spokane, January 23rd, it was given out that 14 veins of coal had been uncovered on the property and that the company would be in condition to ship by September next. The Galbraith at Lundbreck is shipping from 150 to 200 tons daily. This company has some good coal, but not a very extensive working area.

Business is slack along the Crow's Nest just at present, but it is expected that shipments will be increased and other properties put back to work in the next few months. The winter being a mild one and the shut down of some of the metal mines have partly caused this condition to exist.

COAST.

A strike is reported from the Marble Bay Mine, Texada Island at a depth of 860 feet. It is said to be a rich bornite and the body seems to be extensive. Some ore carrying rich grey copper has also been uncovered.

Hon. R. G. Tatlow has introduced a bill to the House at Victoria for a uniform tax on coal products throughout the province, that seems a praiseworthy move. This would do away with anomalies existing under present conditions; for instance, the C. U. P. Coal Company is taxed 5 cents per ton on coal and 5 per cent. royalty, while there are other coal mines in the Province, the usufruct of which is enjoyed free of royalties. It seems only just and fair that all of the coal lands and their products should be taxed in a uniform manner.

[EDITOR'S NOTE.—On the last point we do not agree with our correspondent. It is an open question whether the Crow's Nest Pass land are or are not exempt from royalty. As a matter of fact the company has paid royalty for some years under protest. The matter is discussed on our editorial pages.]

ALBERTA.

COLEMAN.

At two mass meetings of the Coleman Miners' Union 2633 United Mine Workers of America, the following resolution was carried unanimously:—

Whereas, the vocation of coal mining is known to be an hazardous calling as witness the four terrible disasters which recently occurred in the United States, not to recall the immense loss of life in Fernie a few years ago and in Coleman last April when our beloved brothers were snuffed out like a candle, and

Whereas, accidents are continually occurring which maim the workers who follow coal mining, and serve to incapacitate them for thereafter earning a living, and

Whereas, many of those workers have wives and families dependent on them, who are thus left helpless and without an additional charge on their hand, and

Whereas, the unhealthiness of the occupation is beyond question, the low lights with which we are compelled to work, involving a strain that is injurious to the eyes, the confinement which impairs vitality and the unseen dangers that menace, therefore

Be it resolved, that we the members of Coleman Local 2633 U. M. W. of America in mass meeting assembled, demand of the Provincial Parliament that they take cognizance of these conditions and their attendant hardships, and mete out a small measure of justice to the workers in this most important industry of the Province, by passing at the next session of Parliament an eight-hour bank to bank law identical with the law now in force in British Columbia and a Compensation Act along the lines adopted by the Imperial Parliament, and

Be it resolved further, that copies of this resolution be forwarded to Hon. Premier Rutherford, Hon. John P. Marcellus, the Alberta Executive Trades and Labor Council, the District Board, the Fernie "Ledger" and the "Great West."

Whereas, under the present Mines Inspectors' Act, the inspector after examining the mines records his findings in a book provided for the purpose in the company's office. This arrangement prevents to a very great extent, the mine workers from being conversant with same, and

Whereas, under the existing law the visit of the Mines Inspector are times optional with him, therefore

Be it resolved, that we the members of Coleman Local 2633 U. M. W. of America in mass meeting assembled, urge upon the Provincial Parliament the necessity of amending the Mines Inspectors' Act, so that the Mine Inspector shall be compelled to visit each mine in his district, at least, once every six weeks, and post his report at the mine mouth, in the interests of the workers employed therein, and

Be it further resolved, that copies of this resolution be forwarded to Hon. Premier Rutherford, Hon. John P. Marcellus, the Alberta Executive Trades and Labor Council, the District Board, the Fernie "Ledger" and the "Great West."

Whereas, at present there is no law providing that miners shall receive dynamite or patent powders in a condition fit to use in their working places, and

Whereas, there have been many accidents owing to their being compelled, under present conditions, to thaw their own powder,

Be it resolved, that we the members of Colman Local 2633, U. M. W. of America, in mass meeting assembled, draw this to the attention of the Provincial Government, that they may see the necessity of enacting a law compelling mine operators to provide a place suitable for the storing and preparing of powder to be used where the miners may receive it for use when necessary, and

Be it further resolved, that copies of this resolution be forwarded to Hon. Premier Rutherford, Hon. John P. Marcellus, the Alberta Executive Trades and Labor Council, the District Board, the Fernie "Ledger" and the "Great West."

SASKATCHEWAN.

COALFIELDS.

John Galvin, vice-president of the United Mine Workers of America is at present in the district organizing the various coal mining camps. For some time past trouble has been brewing between the Manitoba & Saskatchewan Coal Mining Company, of Bienfait, and the organizers of the union movement. This trouble reached a climax when Senator Watson, managing director of the company ordered Vice-President Galvin, off the company's property and informed him that, he would allow no uion paid organizer on the premises. Mr. Galvin informed Senator Watson that his men were already members of the union and that if their grievances were not listened to and redress obtained, a Board of Investigation would be applied for, under the Lemieux Act.

The Manitoba & Saskatchewan Coal Commpany employ about 100 men, and are working a thick seam of lignite coal lying about 80 feet below the surface. The company has installed an up to date plant, which is designed to produce the coal as economically as possible and load it on the cars, as free from all impurities as possible.

GENERAL MINING NEWS

NOVA SCOTIA.

SPRINGHILL.—The Conciliation Board, which met to consider the trouble between the Springhill miners and the Cumberland Coal & Railway Company has decided every point in favor of the men. The company was not represented upon the Board.

Justice Patterson was chairman, Deputy Commissioner.

PORT HOOD.—An explosion occurred in the south levels of the Port Hood collieries at 7.30 a.m., on February 7th. Ten men were killed instantly. The victims were terribly disfigured. Six were natives of Cape Breton. Their namer are, Malcolm Beaton, John T. Campbell, John Lauchie Gillies, Duncan R. McDonald, Allan R. McDonald, and William McKenzie. They were all young married men. The four other victims were Bulgarians, who had been in this country but two months. The limited area affected by the explosion induces the belief that it was due to the ignition of powder and not gas. The Port Hood mines are not gaseous.

NEW BRUNSWICK.

BATHURST.—Preliminary surveys are being run between points on Bathurst harbor and the iron ore deposits of the Drummond Mines Company, near Grand Falls, on the Nipisiquit River.

There is strong probability that the company will be encouraged to erect a smelter near their property.

ONTARIO.

TORONTO.—The mining tax, put into effect last winter, by the Ontario Government, has brought $100,000 to the Provincial Treasury. No appropriation has as yet been made to encourage smelting. This, it is understood will come later.

COBALT.—Two sample cars of ore have been shipped from the City of Cobalt mine to Ottawa for experimental treatment by electric process.

At the Argyle the lake front shafts no. 5, 6 and 7, have been abandoned and a new shaft, now down 60 feet, is being sunk and timbered, in a more advantageous position.

Mr. E. L. Fraleck, superintendent of the Cobalt Lake Mining Company, in a recent report, tellls of the finding of a new vein of calcite in the cross cut parallel to No. 4 vein, and 18 feet to the south of it.

During the past month the north shaft has been timbered, and a drift run eight feet to the west. No. 4 shaft is down 164 feet, and a level station was cut at the 154-foot level.

The drift to the west is in 20 feet on the first level, the north cross cut has been driven in a total distance of 200 feet from No. 4 drift. On No. 3 vein a raise of 23 feet has been made.

The south cross cut of No. 5 shaft is in 117 feet and the north cross cut is in 117 feet.

About fifteen tons of ore were taken from vein in a month.

The Nancy Helen Mine may be the site of a stamp-mill and concentrating plant similar to that on the McKinley-Darragh.

During January La Rose shipped most of its ore to Denver; but one car was shipped to New Jersey.

The Kerr Lake branch of the T. & N. O. Railway will be completed during February. The Provincial mine will then begin shipping. The Deloro smelter will probably treat the ore.

One thirty-ton car of high grade ore and three thirty-ton cars of low grade ore were shipped during the week ending February 1st, from the Silver Queen mine. The high grade ore went to Copper Cliff, while the low grade ore went to New York. A new assay office has been erected, and is now in good working order. The smelter, which was closed down a few days for repairs, has recommenced.

MICHIPICOTEN.—Electric power was turned on at the Grace mine on Thursday, January 16th. Three Westinghouse motors of 100 h.p., 50 h.p., and 40 h.p., respectively, the first two constant speed and the third variable, all of induction type. The power is transmitted from Michipicoten Falls, a distance of five miles at a voltage of 10,000 and is transformed to 400 volts. There is also a 10 K.W. transformer which still further reduces the current to 100 volts for lighting. The Grace mill has 10 stamps dropping constantly. The Helen mine ore is being stacked at the Wa-Wa pile. The Golden Reed mine is installing three constant speed motors. The Huntingdon mill and the Merralls mill will be taken in over the ice and installed.

SAULT STE. MARIE.—The steel plant, including the bessemer, open hearth, blowing and rail mills resumed operations in all departments on Friday morning, January s31t, after a suspension of about a fortnight.

PORT ARTHUR.—The Beaver Superior Company is shipping another carload of silver ore to Denver. A stamp mill will be erected at an early date.

BRITISH COLUMBIA.

FERNIE.—The Crow's Nest Pass Coal Company has now 2,500 men on its payroll. The monthly payroll amounts to $190,000. Mr. G. G. S. Lindsey, and Mr. J. McEvoy recently visited Victoria. They are now back in Fernie.

The output of coke is holding steady at over 800 tons daily. This is slightly less than the normal figure. It is probable that no increase will be effected for a few months.

The Fernie "Free Press" traverses severely the action of the British Columbia Legislature in increasing the tax on coal and coke. It alludes to the inopportuness of the present time and to the fact that capital will be deterred from entering the Province. The tax will, it is pointed out, not only discourage coal development, but will fall most heavily upon the smelters. Hence the metalliferous mines will suffer ultimately. The increased cost of fuel will tend to affect the reduction in wages consented to by the workmen of late. The tax is opposed universally by operators and workmen.

HOSMER.—At the Hosmer mines an expenditure of $2,000,000 is being incurred in the erection of 200 coke ovens and a large tipple.

ROSSLAND.—Mr. W. Y. Williams, consulting engineer for the California-Giant Company, left Rossland on January 27th, for Boundary. Mr. Williams reports that the ore-bodies in the Annie, owned by Le Roi Two, have been opened to the east end of line of the California. The tunnel in the California is being extended towords these bodies. The 200 foot shaft, near the portal of the California, is to be deepened. The old ore shoot on the Giant has been reopened and trial shipment are being made.

PHOENIX.—From the date of the blowing in of the Granby furnaces up to the end of January, about 60,000 tons of ore were treated. The full complement of eight will be in operation throughout February. The mines are working up to capacity. The Victoria shaft, where an extensive trolley system has been installed, is now producing ore regularly.

ATLIN.—The Fourth of July and the Beavis mine are being actively developed. On the latter the main shaft is down one hundred feet.

NELSON.—A committee of the city council of Nelson recommended that the city construct a high voltage transmission line along a course marked by the city electrician at a cost, not to exceed $3,500, from the city to the Canadian Zinc Company's plant Mile Point. The Canada Zinc Company is to pay 10 per cent. annually on the cost of construction of the line and to contract with the city for the light and motor load at the plant and also for the smelter load as soon as the city was in a position to supply it.

The shipments for the week ending January 25th show an improvement for the Boundary district. It is not decided yet as to when the B. C. & Dominion Copper Companies will resume work. Rossland is shipping normally although Le Roi is slacking a bit.

Slocan shipments are large. Some ore run last year is being sent down by rawhide. The Arlington and Emerald of the Yuni district are shipping better. Silverton is doing well.

ROSSLAND.—From the report issued to the stockholders of Le Roi Two, Limited, the following regarding the November operations is taken: During the month 2,500 tons (approximately) were shipped. The west Poorman tunnel was advanced 58.5 feet. The ore looked very promising during the greater part of the month, but toward the last it became a little poorer. The average assay has been .37 ounces gold and 6.9 per cent. copper, over an average width of 2 feet 1 inch. The west Josie tunnel has been advanced a distance of 28.3 feet, but some very good ore has been met with. The average assay has been .58 ounce gold and 5 per cent. copper, over an average width of 1 foot 6 inches. On the Hamilton vein on the 300 foot level the main dirve westward was connected with the more westerly portion during the month, and met with ore averaging .62 ounces and 3.7 per cent. copper, over a width of 1 foot 11 inches. The distance driven was 40.9 feet. 300 A Stope, 300: The average assay met with here during the month has been .77 ounce gold and 1.7 per cent. copper, over an average width of 17 inches. No. 40 stope, 300: The average assay met with has been .63 ounce gold and 3.5 per cent. copper, over an average width of 1 foot 7 inches. No. 32 stope: This stope is turning out splendidly, yielding, as it does, both a good tonnage and a good grade. We have not started to draw very heavily from it as yet, however. The average assay of samples taken during the month has been .86 ounce gold and 5.6 per cent. copper, over an average width of 5 feet 4 inches. East Hamilton stope, 500: The larger portion of the work this month has been in the easterly end of this stope, east of the porphyry dike, where a little ore was originally left. The average assay met with here has been 1.82 ounce gold and 3.9 per cent. copper over an average width of 16 inches. In the western end of this stope work has been confined to the medium grade ore, and very little high grade ore has been broken down. The average assay has been .39 ounce gold and 2.4 per cent. copper, over an average width of 2 feet 10 inches. West Hamilton stope, 500: Some excellent ore has been broken down here during the month, the average assay being 2.61 ounce gold and .6 per cent copper, over an average width of 1 foot 10 inches.

At the Vancouver mine during the month of November, 1,839 tons of ore was treated in the concentrating mill, producing 112 tons of lead concentrates and 176 tons of zinc concentrates. The lead concentrates assayed 125.1 ounce silver, 62.1 per cent. lead and 10.3 per cent zinc. The zinc concentrates assayed 40.5 ounce silver, 2.3 per cent. lead and 44.7 per cent. zinc.

MOYIE.—At the tenth annual convention of the Associated Boards of Trade, of Eastern British Columbia, held at Moyie on January 22nd, many delegates from surrounding towns were present. The Moyie Miners' Union very generously put their hall at the disposal of the Convention. President Campbell, of the Moyie Board, reveiwed the mining and metallurgical condition and the metal market for the past year. Among those present were Mr. R. R. Hadley, of the Dominion Department of Mines.

VANCOUVER.—The report of a cave-in at No. 2 tunnel of the Nicola Valley Coal & Coke Company, Limited, has been officially contradicted. No. 2 tunnel is in excellent shape. It is now 1,200 feet in length and is working three shifts.

A stampede of prospectors is taking place to the confluence of the Ingenia and Findlay Rivers, under way between the Canadian Rockies and the Cassiar Mountains. Rumors of rich gold deposits are the cause.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

A table of fatal mine accidents in 1907, issued by the Government shows a total of 1,239 deaths from accidents in coal mines, an increase of 97 over 1906. Of these 572 were due to falls of the roof or sides. Deaths from accidents in metalliferous mines numbered 34, and in quarries 89, the figures in both cases showing slight reductions over those of 1906.

The iron anad steel exports of the United Kingdom (not including iron ore, scrap iron and steel, implements, machinery and strips) in 1907 was £46,661,848, compared with £39,840,595 in 1906. Imports under the same heading were valued at £7,215,179, as against £7,215,179, as against £8,359,752 in 1906.

The iron mining industry at Watchet, Sommersetshire, closed down in 1884, is being resumed. A syndicate has been formed for working the Brendon Hills, which contain large quantities of iron ore, and the disused railway is being put in working order.

GERMANY.

In order to lessen the danger of explosions and disasters in coal mines, investigations have been extensively carried on by the Government as to mining conditions, the results of which will be laid before the Reichstag. Efforts are being made to ascertain how far stricter regulations of ventilation can avert the danger from fire damp and other causes. Drastic measures have been taken in some cases, one mine in South Germany being compelled to make alterations, costing $125,000.

The discovery of an important deposit of coal is reported from Ruckmansdorf, near Leipzig.

BELGIUM.

The production of pig iron last year was 1,427,640 tons, as against 1,431,460 tons in 1906.

RUSSIA.

Work in the production of manganese in the Tchiatin manganese area has to a great extent ceased. The exportation of the ore has declined and many hands have been thrown out of work.

Contractors for coring for petroleum at Baku, in the Caucasus, employing about 8,000 men, have formed a syndicate and nearly

doubled their charges, at the same time considerably reducing wages. The syndicate is strongly organized and attempts to strike have turned out failures.

About the beginning of 1909, it is proposed to hold in St. Peterburg an international exhibition of preventive measures against accidents and fires adopted in factories and mines. All branches of mine sanitation and hygiene will be included.

SOUTH AFRICA.

The report of the Transvaal Mining Department for the ending June 30th, 1907, gives the output of coal for the fiscal year at 2,912,083 tons, value, £796,361, as against 2,751,136 tons, value, £837,176, for the previous year. The number of employees was 10,885, of whom 498 were whites and 10,387 colored.

The stope drill trials for a valuable trophy, given by the "South African Mines" newspaper, at Johannesburg, which aroused great interest, took place during December and resulted in a victory for the Gordon drilll. Messrs. Eckstein are installin 200 of these drills. Twenty-five drills worked by 4 whites and 25 natives are being started at the Crown Deep mine. The success of these drills is expected to lessen greatly the difficulties presented by the labor problem.

The discovery of a promising zinc deposit, at Nkandala, Zululand, is reported. Specimens show zincblende, carrying a large percentage of bornite. The natural facilities for exportation are excellent.

Work has been started on the Usutu Tin mines, Swaziland.

AUSTRALASIA.

The Tasmanian Government has voted £2,000 for the exploration of the mineral belt back of Lyell, along the route of the Great Western Railway.

Recent developments at the copper mines, at Mount Lyell, Tasmania, indicate that the ore bodies extend downwards to the 1,000 foot level.

On the Macquarie River, near Stuart Town, new South Wales, the Enterprise Syndicate dredger recently made a record by obtaining a return of 172 ounce of gold for 124 hours work. The syndicate owns property on the river sufficient to keep the dredge working 20 years.

The gold production of Australasia for 1907 was 3,090,621 ounces of fine gold, as compared with 3,416,464 ounces for 1906. Of this, the Commonwealth of Australia produced 2,582,413 ounces and New Zealand, 508,208 ounces.

UNITED STATES.

An independent smelter will shortly be erected at, or near, Helena, by the mine-owners of Montana. A large amount has been subscribed by the Mine-Owners Organization. The plant will have an initial capacity of 500 tons every 24 hours.

Capt. J. W. Boyd, who located the famous United Verde copper mine, recently died in Prescott, Ariz, aged 86. The mine which he sold for a few hundred dollars is the second richest in the United States and has paid over $25,000,000,000 in dividends. Boyd died penniless.

The Bullion King Mining Company operating in San Juan Country, Colo., has struck an ore body 12 feet in width, 206 feet from the surface and covering lead, silver and gold in the neighborhood of $100 to the ton.

The Stoddart Mines Company is expending $300,000 on development and improvement on the Binghampton mine, near Humboldt, Ariz. A 500 ton smelter will be built.

The Copper Queen Company, of Bisbee, Ariz., did 5,600 feet of development work during December. They have also increased the capacity of their smelter at Douglas by one furnace and one conveitor.

MEXICO.

Chas. M. Schwab and Malcolm MacDonald, of Tonapah, Nev., and associates are acquiring extensive mining properities of Santa Eulalia. The price is stated to be $6,000,000.

The Peregrino, Pinguico & Mexican Milling Companies, known as the Bryant concerns, operating in Chihuahua are producing $500,000 per month, the monthly profits being upwards of $200,000. The Pinguico is treating 200 tons daily. The Mexican Miling Company recently started work on its projected mineral belt railroad.

COMPANY NOTES.

The International Coal & Coke Company has declared the regularly quaterly divident of 2 per cent., payable February 1st.

The annual meeting of the Dominion Coal Company will be held in Montreal on March 6th. Books close February 21st to March 6th.

Montreal shareholders of the Cobalt Lake Mining Company have appointed Messrs. Marchand and Pratt to represent them at the annual meeting.

At the annual meeting of the Dominion Copper Company, held at Phoenix, B.C., to-day. Mr. M. M. Johnson was elected a director to succeed Mr. A. M. Wickwill.

The American Smelting & Refining Company has posted notices announcing a reduction in wages commencing February 11th. The reduction affects 700 men and ranges from 10 to 20 cents per day.

The Sullivan Machinery Company announces that Mr. George M. Bertram, for several years connected with this company, is appointed local manager of its Joplin, Missouri, branch office, succeeding Mr. Randolph D. Talmage. The company bespeaks for Mr. Bertram the same courtsey from patrons and friends which has been accorded in the past to its other representatives.

The recond annual stockholders' meeting of the Crown Coal & Coke Company, whose coal lands are in the Crow's Nest district, was held, late in January, at the general offices of the company in Spokane. Within a distance of two and one half miles 14 veins have been opened. A tipple of a capacity of 2,000 tons per diem will soon be under construction. By next autumn the company hopes to be shipping 1,000 tons daily.

The following directors were elected for the ensuing year: C. L. Butterfield, Moscow, Idaho; F. L. Farrel, Wilwaukee, Wis.; R. G. Belden, A. E. Wayland, J. H. Hemphill and F. H. Mason, of Spokane; J. T. Nevin, Pittsburgh, Pa., and I. A. Barnes, Minneapolis, Minn., who in turn elected as officers C. L. Butterfield, president; F. L. Farrel, first vice-president; R. G. Belden, second vice-president and general manager, and A. E. Wayland secretary-treasurer.

At the annual meeting of the shareholders of the Silbert Mining Company the report of the president showed that the company was capitalized at $2,000,000, in one dollar shares, of which 1,000,000 shares remained in the treasury. The property consists of 40 acres, and includes the old Silver City and the Albert claims. The plant is worth $1,600 and the building is valued at about $1,000. Several shafts have been sunk to depths varying from eight to eighty feet deep, but no pay ore has been encountered. The directors intend to sell sufficient stock to continue development work, principally in sinking on the 80-foot shaft. Mr. Geo. Stevenson was re-elected president of the company.

At the annual meeting of the Erie Cobalt Silver Mining Company, Limited, held in the company's office, 5 King street west, Mr. J. H. Jewell, the president occupied the chair. There was spent the past year on development work and operation $49,000. The value of the ore pile is estimated at between $50,000 and $60,000. Additional new plant is to be installed. The shareholders unanimously adopted the report of the company, which still has half it capital stock. Mr. Neil R. Macdonald, manager of the proposal to buy a concentrator, said it would be advisable to wait six months before commencing to figure on one, as there are several different makes, either in operation or under construction, at the present time, and he wished the shareholders to have the benefit of the trials.

STATISTICS AND RETURNS.

According to the estimates of L. Vogelstein & Company, 100 Broadway, New York, the German consumption of foreign copper for the year 1907 was as follows:

Imports	128,006 tons
Exports	8,454 tons
Consumption	119,552 tons

During 1906 the corresponding figure was 119,555 tons.

Of this quantity 103,530 tons were imported from the United States.

The production of coke and pig iron continued to fall off in volume, the January output being only, according *The Iron Age*, 1,045,525 tons, compared with 1,234,279 tons in December, 1,828,125 tons in November and 2,336,972 tons in October. The most rapid restriction took place during that period with the steel furnaces, which fell off from 1,514,000 tons in October to 660,000 tons in January. Merchant furnaces cut down their production more gradually, dropping from 822,000 tons in October to 744,000 tons in November, to 575,000 tons in December and 407,000 tons in January. Even then they have quite generally increased their stocks on hand, to judge from partial reports. Recently there has been some blowing in on the part of steel works furnaces, while merchant stacks have been blowing out. The result is that there were active on February 1 142 furnaces, with a capacity of 241,925 tons, as compared with 151 furnaces on January 1, with 235,152 weekly capacity.

The output for the collieries of the Crow's Nest Pass Coal Company for the week ending February 7th was 20,431 tons, or a daily average of 3,405 tons. For the corresponding week of last year the output was 13,693 tons, a daily average of 2,315 tons.

Shipments from the Springhill Collieries of the Cumberland Railway & Coal Company for January were 37,015 tons.

Dominion Coal Company outputs for January, 1908:—

Dominion No. 1 Colliery	44,087
Dominion No. 2 Colliery	61,826
Dominion No. 3 Colliery	30,044
Dominion No. 4 Colliery	42,158
Dominion No. 5 Colliery	50,524
Dominion No. 6 Colliery	20,661
Dominion No. 7 Colliery	6,938
Dominion No. 8 Colliery	13,999
Dominion No. 9 Colliery	31,389
Dominion No. 10 Colliery	10,732
Total	312,358 tons

British Columbia shipments for week ending February 1st are as follows:

District.	Week. Tons.	Year. Tons.
Boundary	22,011	69,332
Rossland	5,945	28,312
Slocan-Kootenay	3,052	14,418
Totals	31,008	112,062

B. C. SHIPMENTS WEEK ENDING JANUARY 25.

Nelson, B.C.—Shipments from the mines and receipts at the smelters of Southeastern British Columbia districts this past week and year to date were as follows:—

District.	Week.	Year.
Boundary	18,075	47,321
Rossland	5,394	22,347
East of Columbia River	3,039	11,000
Totals	26,508	80,668
Smelter receipts—		
Grand Forks	18,075	47,321
Trail	5,141	19,975
North Portal	1,629	7,030
Marysville	675	2,355
Totals	25,520	76,681

The revenue of the province of Ontario from the mining tax last year, it is said, was between $90,000 and $100,000.

Following are the shipments from Cobalt camp for the week ended February 1st:

	Tons.
Buffalo	110,750
Cobalt Lake	50,800
Foster	68,600
LaRose	40,000
Nipissing	59,290
O'Brien	256,370
Standard	39,730
Silver Queen	243,000
Silver Cliff	52,000
Silver Leaf	62,000
Temiskaming	59,400
Temiskaming & H. B.	66,000

The total shipments for the week were 743,900 pounds, or 371 tons. The total shipments from January 1 to date are 2,651,750 pounds, or 1,325 tons.

The Dominion Steel Company received no less than $1,223,202 in bounties in 1907, getting $313,500 on pig iron, $497,212 on steel, and $412,417 on wire rods.

This was far and away the largest amount paid, the Algoma Steel Company coming second, with $556,268.

The bounties paid the various concerns were as follows:—

	On pig iron.	On steel.
Dominion Steel	$313,573.42	$497,212.07
Hamilton Iron	121,422.26	102,124.04
N. S. Steel & Coal	63,343.25	115,867.08
Can. Iron Furn. Co.	13,850.09	.....
Can. Iron Fur. Co. (Midland)	32,577.79	.....
John McDougall & Co.	5,200.92	.....
Londonderry Iron & Mfg. Co., Ltd.	43,534.61	.....
Algoma Steel Co., Ltd.	177,570.16	378,698.73
Deseronto Iron Co., Ltd.	4,487.00	.....
Atikokan Iron Co., Ltd.	17,210.46	.....
Elec. Reduc. Co.	235.20	.....
Lake Superior Iron & Steel Co.	.....	5,719.68
Ont. Iron & Steel Co.	.....	251.77
Totals	$793,005.27	$1,099,873.37

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt Camp, and those from January 1 to date:—

	Week ending Jan. 25. Ore in lbs.	Since Jan. 1 Ore in lbs.
Coniagas	66,470	133,490
Buffalo	.....	63,000
Foster	40,000	40,000
La Rose	300,000	596,000
McKinley	120,000	120,000
Nipissing	64,000	250,290
Nova Scotia	.....	40,790
O'Brien	.....	120,000
Kerr Lake	39,980	39,980
Watts	.....	64,780
Standard	39,730	39,730
Silver Queen	243,000	243,000
Silver Cliff	52,000	52,000
Townsite	.....	45,100
Temiskaming	59,400	59,400

The shipments for the week were 984,600 pounds, or 492 tons. The total shipments from January 1 to date are 1,907,850 pounds, or 953 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons. In 1904 the camp produced 158 tons, valued at $136,217; in 1905, 2.144 tons, valued at $1,473,196; in 1906, 5.129 tons, valued at $3,900,000. The estimated value of the ore shipments for 1907 are between $10,000,000 and $12,000,000.

The Dominion Coal Company made a record for January, the output being 314,322 tons, against 269,000 tons during the same month last year, an increase of 45,232 tons.

For the month of January the Dominion Iron & Steel Company is able to announce new records in every department of the plant in operation. This will be gratifying to all interested in the big Sydney industry. The following are the details of the output of the various departments for the month:—

	Tons.
Coke	40,608
Pig iron	29,320
Ingots	26,245
Blooms	23,594
Rails	18,182

The shipments aggregate within a few tons of 2,000, which, though not a record, is above the average for the winter months. On several days during the month, the production in the various departments was considerably higher than the average for the month, and, on this the officials base their belief that higher records are in store for future months.

The first announcement of record-breaking output this year was made on January 2nd, when the blast furnaces produced 1,027 tons, and this was followed on the 7th by another record in the same department of 1,135 tons.

The open hearths' first January record was 1,116 tons, made on January 23rd, and this was further increased to 1,169 tons on January 31st, the highest in the history of the plant.

Cobalt shipments were, for week ending Saturday, January 25, as follows: La Rose, 5 cars, 150 tons; McKinley, 2 cars, 60 tons; Queen, 4 cars, 121 tons; Foster, 1 cars, 20 tons; Temiskaming, 1 car, 30 tons; Nipissing, 1 car, 32 tons; Coniagas, 1 car, 33 tons; Silver Cliff, 1 car, 26 tons; Central, 1 car, 20 tons.

The total copper production of the world is estimated at 720,000 tons in 1907, as against 712,000 tons in 1906, and 708,000 tons in 1905. Output of the United States declined 10,000 tons; that of other countries has advanced about 18,000 tons.

Catalogues and Other Publications Received.

Bulletin 102, December, 1907, issued by the John McDougall Caledonian Iron Works Company, Limited, of Montreal, describes five installations in Canada of the Worthington multi-stage turbine pump. At Trail, B.C., the Consolidated Mining & Smelting Company operate a three-stage 6-inch horizontal Worthington pump, capacity 1,250,000 gallons in 24 hours against 150 pounds pressure. It is belted to a 100 horse-power induction motor. At a Montreal pumping station a three-stage 14-inch pump, of a capacity of 5,000,000 gallons in 24 hours against 110 pounds pressure is in use.

"Lifting Magnets" is the title of a most artistically done catalogue, received from the Electric Controller & Supply Company, of Cleveland, Ohio. This company's Type "S" magnet, brought out in 1905, was the first magnet designed to handle pige iron, steel and iron scrap, castings, rails and other miscellaneous magnetic material. The Type "S" magnet saves labor in handling melting stock for open-hearth furnaces, for loading and unloading pig iron for foundry purposes, etc., etc., and especially in moving all varieties of heavy and light scraps. Among Canadian users of these magnets are the Grand Trunk Railway, and the Nova Scotia Steel Company.

MARKET NOTES.

Silver.—January 23rd, 55 3-4; January 24th, 55 3-8; January 25th, 55 1-2; January 27th, 55 7-8; January 28th, 55 3-8; January 29th, 55 1-2; January 30th, 55 3-8; January 31st, 55 1-4; February 1st, 55 1-2; February 3rd, 55 1-2; February 4th, 55 1-2; February 5th, 55 1-4.

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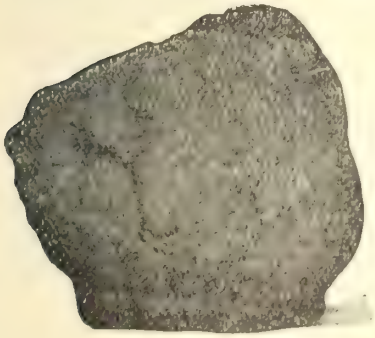
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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

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Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries,
Parliament Buildings, Quebec.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

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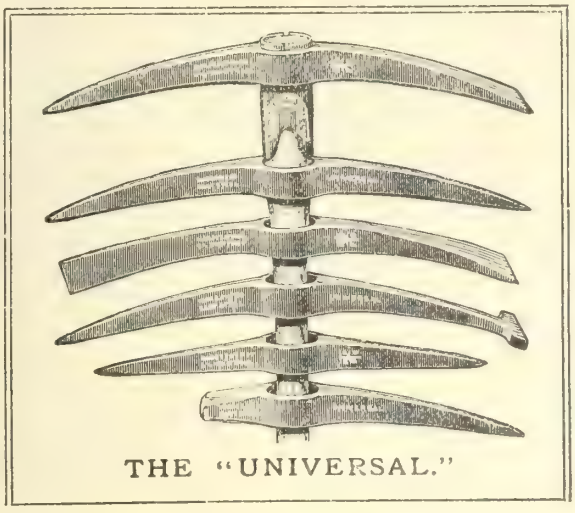
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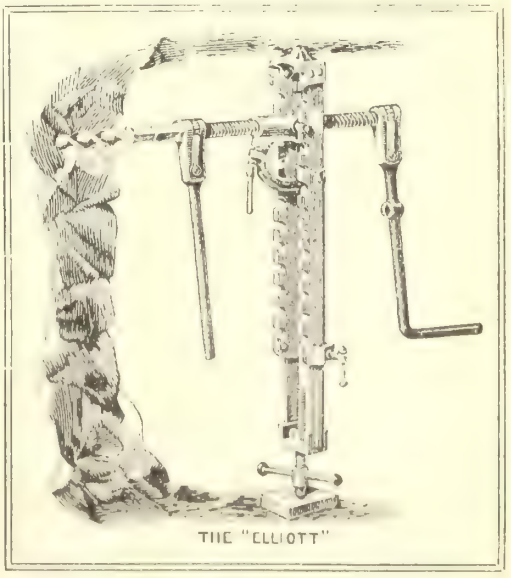
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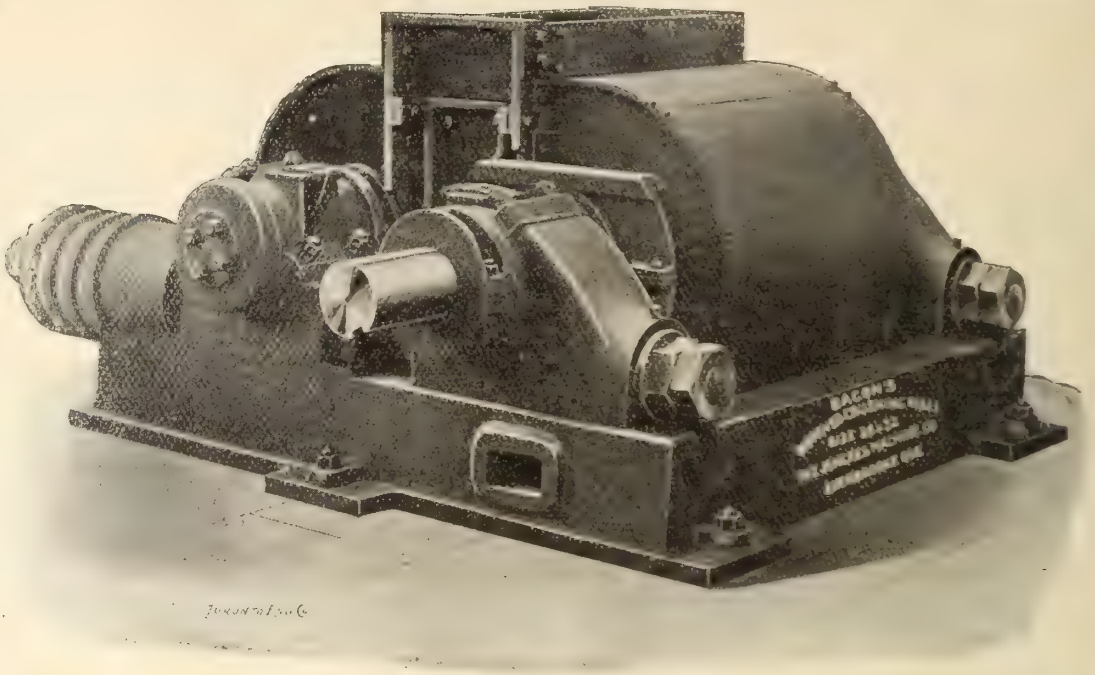
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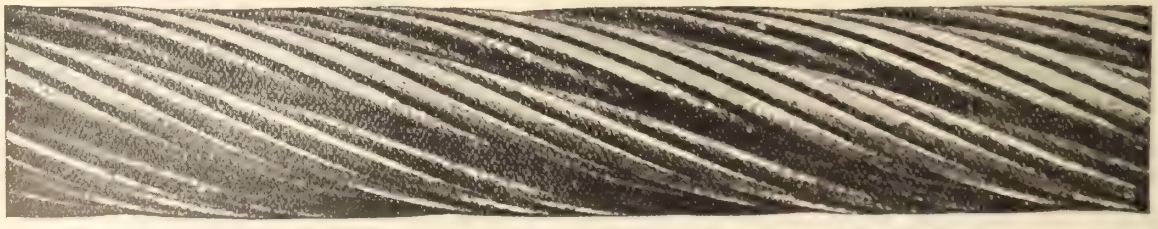
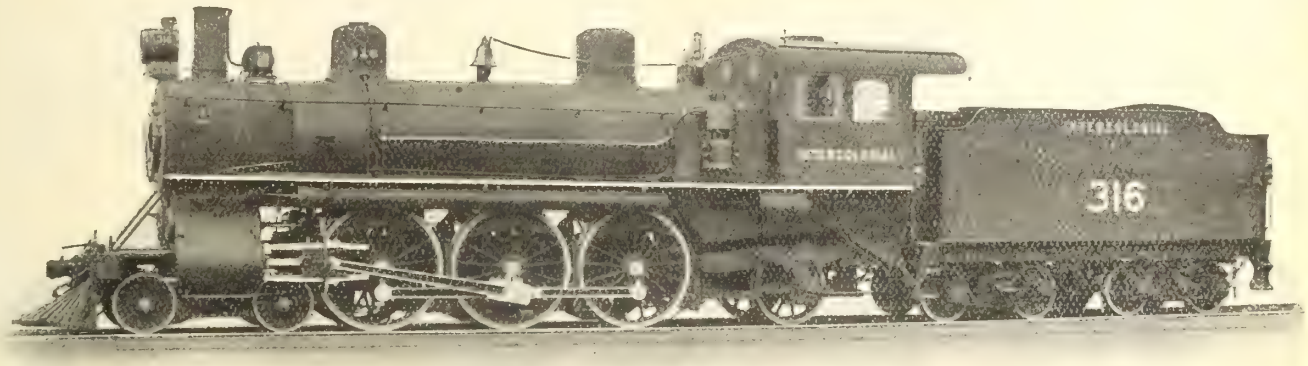


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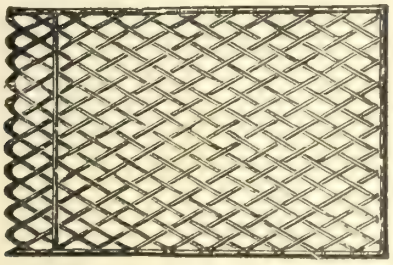
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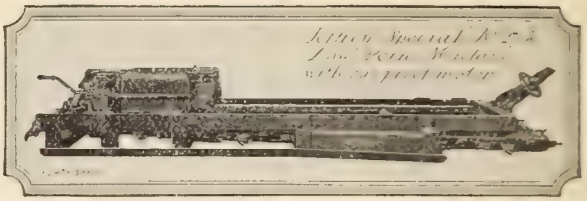
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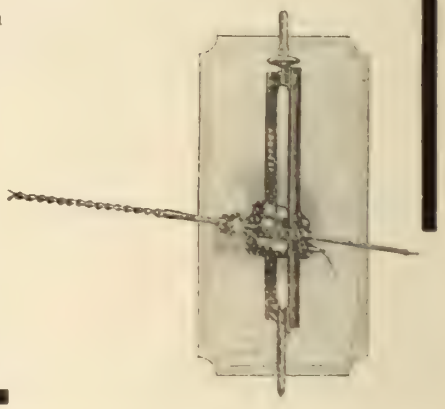
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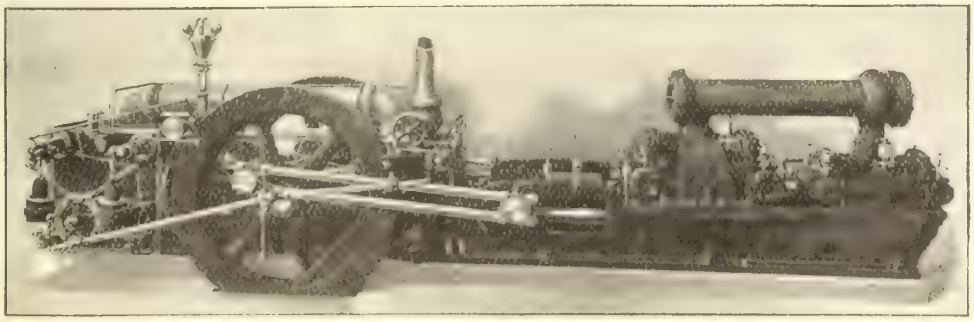
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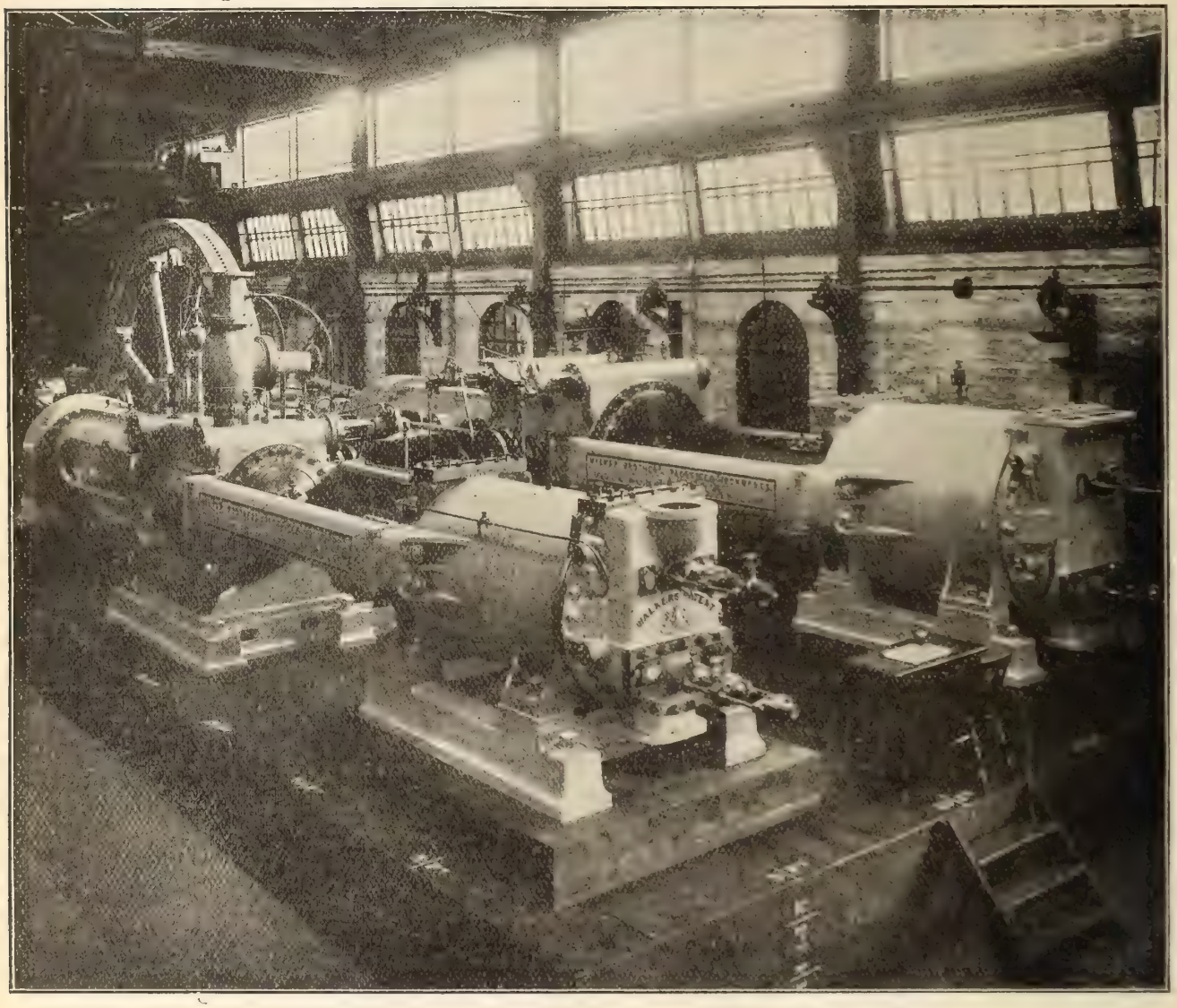
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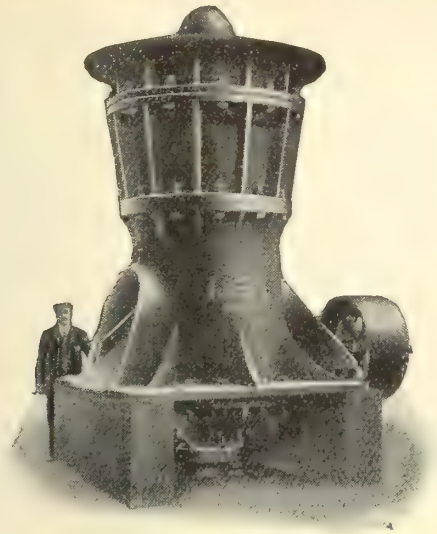
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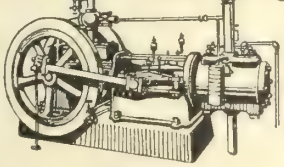
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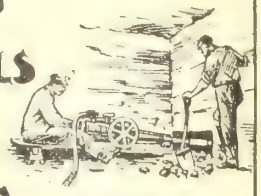
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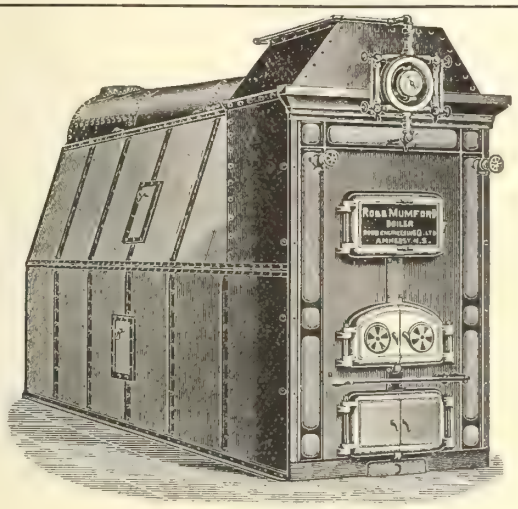
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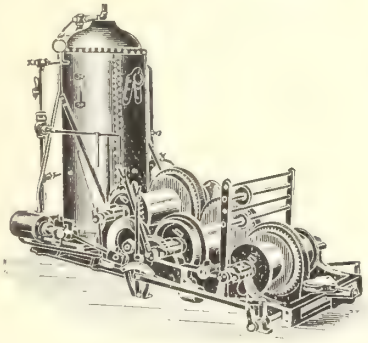
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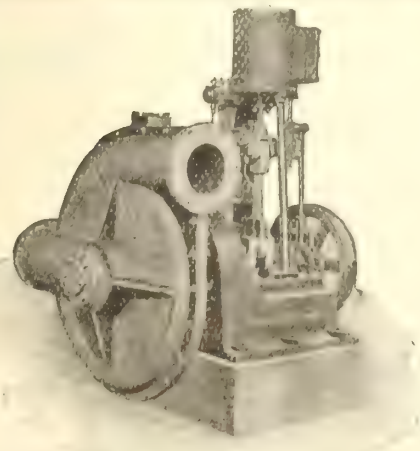
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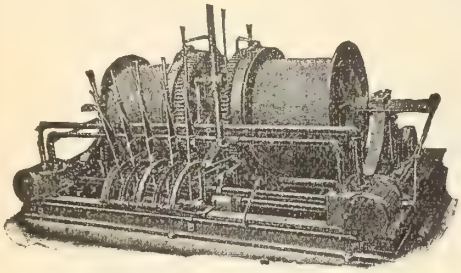
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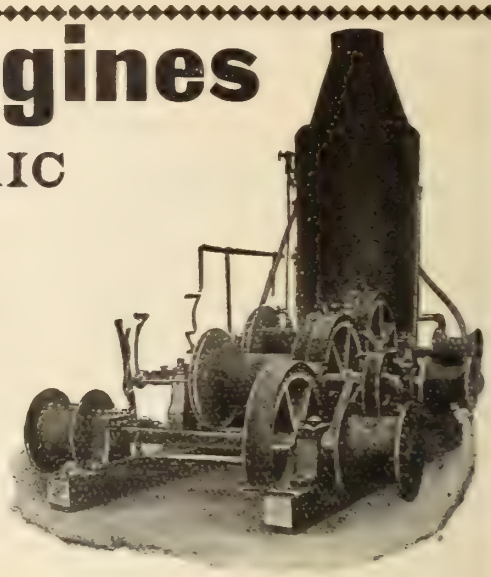
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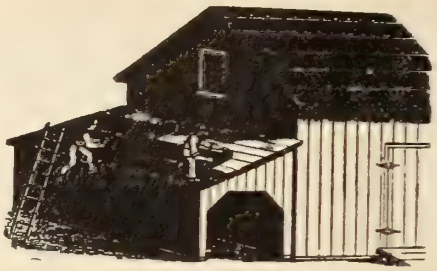
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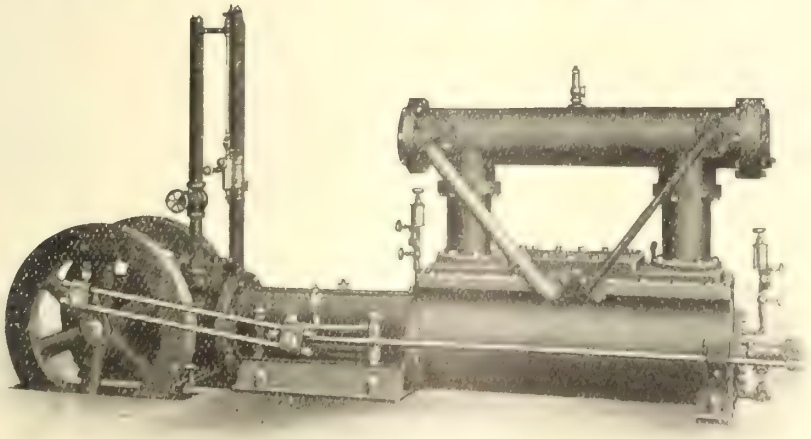
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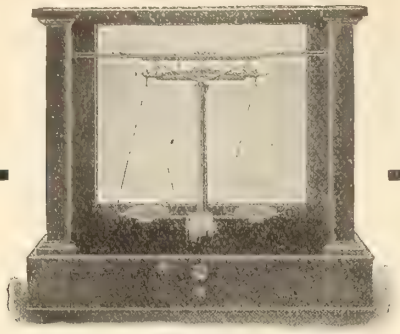
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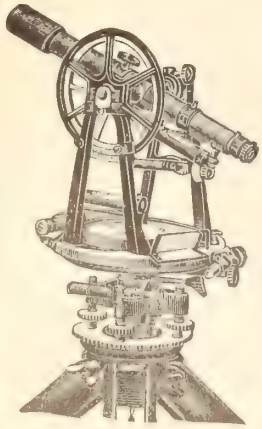
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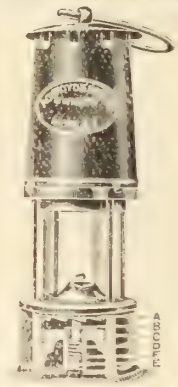
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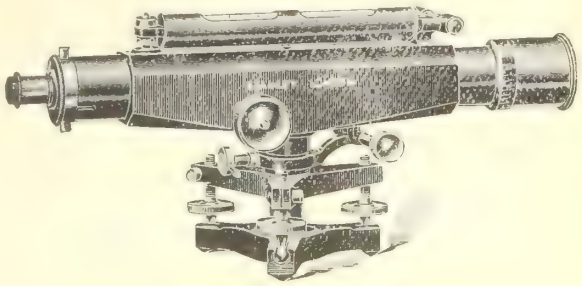
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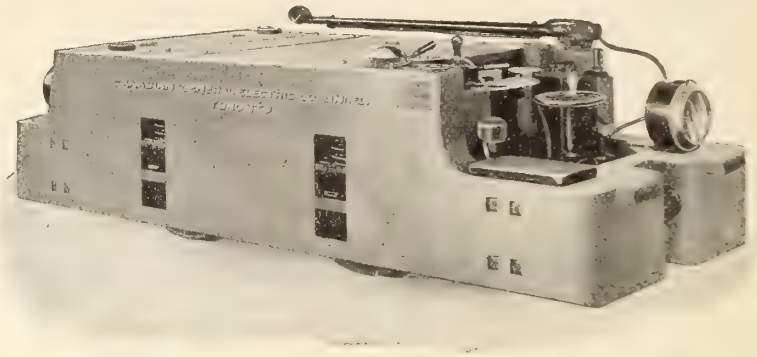
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THE CANADIAN MINING JOURNAL

THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

VOL. XXIX. TORONTO and MONTREAL, March 1, 1908 No. 5

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THE BRITISH COLUMBIA UNIVERSITY BILL.

Last summer Dr. J. Bonsall Porter, representing McGill University, brought before the Province of British Columbia the question of establishing a Provincial University. The aid of McGill was offered; but it was carefully explained that this aid was tendered unconditionally. Dr. Porter outlined a plan that met with hearty approval. "For years," he remarked, "it has been our policy to promote and unify advanced teaching in the East as well as in the West, by affiliating local institutions whenever possible, and thus establishing standards which could scarcely be maintained by separate and weaker bodies . . . Whenever you are in a position to get on without help we shall quite contentedly drop out."

The Hon. Dr. Young, who is responsible for the Bill, in a lucid and well-balanced speech moved its second reading recently. After removing any misapprehension as to the attitude of the University of McGill, he stated that the Universities of Toronto and Queen's were entirely in accord with the movement.

The provisions of the University Bill are statesmanlike in tone. The governing body is to be chosen thus:

"The first convocation of the University shall consist of all graduates of any university in His Majesty's Dominions who are actually residing in the Province two years prior to the date fixed for the first meeting of convocation, and who at least six weeks prior to the said date register themselves as members of such convocation, as hereinafter provided:

"Twenty-five members to be selected by the Lieutenant-Governor in Council and appointed for the first convocation only.

"After the first convocation, all convocations shall be composed of the Chancellor, the Senate, the members of the first convocation, and all persons who shall have become graduates of the University."

Clauses 21 and 22 provide thus:

"There shall be and there is hereby constituted a Board of Management for the University, under the name of the Board of Governors of the University of British Columbia.

"The Board shall consist of the Chancellor, who shall be chairman thereof, and the President of the University, both of whom shall be, ex-officio, members thereof, and nine persons appointed by the Lieutenant-Governor in Council."

The proposed University is to be strictly non-sectarian. Tuition in the department of the Faculty of Arts is to be free. The University will work in conjunction with the Mining School, the Normal Schools and the High School systems. Night Schools are also to be established.

In brief, the Hon. Dr. Young's scheme is comprehensive and effective.

British Columbia should be grateful to the gentlemen whose patriotic zeal has inspired this movement. Particularly are the disinterested efforts of McGill's representative, Dr. Porter, to be commended.

There has been adopted in Nova Scotia a systematic scheme of technical instruction. Ontario is awakening to the need of more complete arrangements for such education. The Federal Government is considering the advisability of appointing a commission to visit foreign countries and report upon their systems of trades schools and technical colleges. The technical colleges of the East are full to overflowing. Many of their best students come from British Columbia.

All of these considerations lend force to the conviction that no time could be more opportune than the present for the establishment of the proposed University of British Columbia.

Here we wish to make one urgent recommendation. If the proposed University is created, it will be wise for British Columbia to develop first the technical branches of instruction. The mining industry is the bone and sinew of the Province, and no truer way of insuring the wise development and conservation of her mineral resources can be devised than by that of training the sons of British Columbia in the sciences of mining engineering, metallurgy and geology. The arts and the humanities may come later.

Also it would be ungracious to refuse the proferred aid of McGill. The high traditions and standards of that University will be of tremendous assistance to the new and traditionless foundation.

It is our earnest hope that but a short time will elapse ere the University of British Columbia becomes an accomplished fact.

CANADIAN MINING INSTITUTE.

The tenth annual general meeting of the Canadian Mining Institute will be held at the Russell House, Ottawa, on Wednesday, Thursday and Friday, March 4th, 5th and 6th.

On Wednesday, March 5th, at 10 a.m., the proceedings will be opened by His Excellency the Governor-General, who has kindly consented to welcome and address the members. If necessary both the morning and afternoon sessions of Wednesday will be devoted to the transaction of business affairs. The Council's report will be read; the treasurer's statement received; and the changes in by-laws determined. At this session, also, the results of the election of officers and members of Council will be announced. On Wednesday evening and at the Thursday and Friday sessions, papers will be read. The annual dinner will be held on Friday evening at 8 o'clock.

GEOLOGY.

In a series of lectures in the course in Science, Philosophy and Art, delivered during the session 1907-1908 at Columbia University, Professor J. F. Kemp spoke on geology. His address is one of unusual excellence. Glancing briefly over the nebular hypothesis, he touches upon the alternative conception formulated by Professor T. C. Chamberlin, of Chicago, whose hypothesis is styled the "Planetesimal Hypothesis." Continuing his survey of the scope of geology, Professor Kemp alludes to a matter that is of signal interest to Canadians. He speaks in terms of high appreciation of the brilliant work of Dr. F. D. Adams, of McGill University, who, with the aid of elaborate and expensive apparatus, succeeded in demonstrating that, under proper conditions, marble could be made to flow like wax, under a strain far beyond the limit of its crushing resistance. Professor Kemp refers to the experiments now being carried on by Dr. Adams upon rocks such as granite, and under burial and metamorprhism. "In so far as these have yet gone," writes Professor Kemp, "they are a striking corroboration of the conclusions reached by observers in the field, among whom Professor Adams also occupies a most honorable place."

THE CONSULTING MINING ENGINEER.

One of the best and clearest expositions of the functions of the consulting mining engineer appeared in a recent number of the *Engineer and Mining Journal*. The article referred to is reprinted on another page of The Canadian Mining Journal.

There are two principal causes of loss and waste in mining investments. The fever of a mining boom hatches a host of fakirs whose object is to milk small investors of sums insignificant in themselves but often aggregating hundreds of thousands of dollars. The success of these schemes depends upon the ignorance of those to whom the appeal is made.

The mining fakir is a serious, although a sporadic, source of loss. He hurts the industry directly and indirectly. To his operations, more than to aught else, may be ascribed the prevalent idea that mining is necessarily speculative.

The mining fakir flourishes because of the profound ignorance of the general public as to what mining means. He will disappear only when in the schools of Canada our children are taught something about our second greatest industry.

The other principal cause of waste and loss is well defined by our New York contemporary. The great losses of money in mining, it is pointed out, are due not so much to deliberately fraudulent schemes as to those innumerable "more or less honest, more or less misguided ventures that are not illegitimate but are entered into without competent engineering advice."

Not seldom private mining enterprises are entered into without the advice of an experienced engineer. Costly mistakes are nearly always the result. Either the plant does not meet the requirements of the ore, and this is most frequently the case, or else there is a painful lack of harmony between the integral units of the overground and underground equipment. Special training, long experience and mature judgment are needed in determining just how much equipment a mine will pay for and just what that equipment shall be.

Although it may be out of the question for the small owner to engage the continuous services of a first-class consulting engineer, yet, as is pointed out in the article alluded to, the full benefit of his advice and guidance may be obtained by arranging to have him visit the mine at stated intervals.

It is, of course, in the actual purchase of the mine or property and in the first installation of equipment that the consulting engineer is most needed, for then his counsel will have a vital bearing upon future operations.

THE BRITISH COLUMBIA COAL TAX.

In our last issue we referred to the new British Columbia tax upon coal and coke. The subject is one of large importance alike to the operators of coal mines and to the owners of smelters and metalliferous mines.

It is worthy of remark that the British Columbia Legislature, in dealing with the matter, consulted none of those whose interests are most deeply affected. This is to be regretted.

It remains for the Canadian Mining Institute to discuss the questions involved and then take whatever action is though fit. Meanwhile the Boards of Trade of Fernie and other towns are protesting vigorously.

MINING SOCIETY OF NOVA SCOTIA.

The annual meeting of the Mining Society of Nova Scotia is to be held in Halifax on March 25th and 26th. The annual dinner, always a well-managed and profitable function, is set for the evening of the 25th.

The Council of the Society has issued a circular announcing that the chief topic of the meeting is to be the "Investigation of the Natural Resources of Nova Scotia." Among the guests of honor will be technogolists of international reputation. In every respect, indeed, the meeting will be made the most notable in the history of the Society.

Nova Scotia possesses large and varied stores of mineral wealth. Coal mining is the Province's most important mineral activity. As yet iron mining has met with but slight encouragement. In fact almost all the progress made in this direction is due to the perseverance and courage of the companies organized and controlled by the Messrs. Drummond of Montreal.

The gold mining outlook, although relieved by occasional successes, is not bright. And for this there is no sufficient reason. We believe firmly that many of the abandoned gold mines of Nova Scotia could be made to yield handsome profits if the mining and treatment problems were attacked as systematically and as scientifically as similar problems in South Africa have been.

Other minerals, such as gypsum, marble, barite, stibnite, infusorial earth, etc., etc., occur abundantly. There is also promise of workable tin deposits.

What Nova Scotia needs is just what the Mining Society is attempting to do. The interest and advice of geologists and engineers from the outside world cannot but be immediately helpful.

NOVA SCOTIA STEEL AND COAL COMPANY.

The annual report of the Nova Scotia Steel & Coal Company, noticed fully on another page, has exceeded expectations. Although affected to some extent by the depression of last autumn, the company has succeeded in showing a large profit on its operations for 1907. Undoubtedly both its outputs and its profits would have been larger had it not been for the slackening of all business in the last months of the year. The falling off of 62 per cent. in the earnings of United States Steel for last December gives a fair criterion as to the manner in which Nova Scotia Steel weathered the storm.

A strong and growing concern, built up by men who were at once careful, progressive, and cleanly ambitious; managed by a capable and energetic executive; the Nova Scotia Steel & Coal Company is a Canadian enterprise of which Canadians may well be proud.

Editorial Notes.

Our Nova Scotia correspondence in the current number should be read by all coal mine operators. Although our news letters from all the mining provinces are valuable and interesting, the questions dealt with by our most easterly correspondent are important in a large and national sense.

The Government of Newfoundland is being criticized for expending thirty thousand dollars on coal boring operations. It is stated that parties are sent out year after year without proper appliances. This criticism seems hardly fair. Even a remote chance of finding coal in Newfoundland should not be neglected.

Estimates of the production of mining camps are very seldom accurate. Even when issued officially they are either incomplete or approximate. The importance of correct returns is indisputable. Investors are influenced largely by a mining district's record. The Canadian Mining Journal receives regularly reports from many mining companies. It would help us greatly if every Canadian mining company sent us monthly returns.

THE ATIKOKEN IRON COMPANY.

L. B. Orchard.

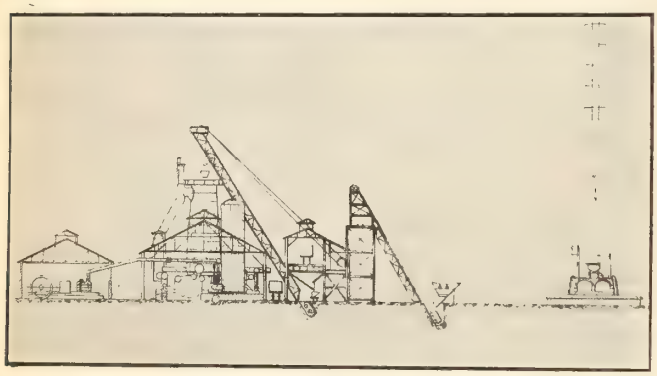
Cuts made from photos loaned by C. N. Ry. Co.

The plant of the Atikoken Iron Company is situated at Port Arthur, on the north shore of Lake Superior. The site selected was one adjacent to the Canadian Northern coal docks.

Dry land was hard to procure, and this was rather a setback to the company in starting operations. The surrounding district is low and swampy, largely muskeg. So the plant was built on a sandbar on the shore line of the lake. In order to procure a good foundation, piles were driven to a depth of about 20 feet to a gravel and clay bottom, and were cut off under water. A concrete filling was then placed over the piles.

The whole plant covers an area of about 2,500 feet by 600 feet, including the dock. It was designed by Mr. Frank C. Roberts, of Philadelphia. The slag from the blast furnace, after having been granulated, was exclusively used for the filling in and the building up of the yards. The main yard and furnace track was built on piles and afterwards filled in in this manner.

The plant is modern in every respect, and no money has been spared to make the industry the most successful the province has seen.



Section showing Stock-Shed, Furnace, Roaster and Ovens.

Furnace.—This is 75 feet high and has a 14 foot bosh and a hearth 8 1-2 feet in diameter. The capacity of the furnace is 100 tons per 24 hours; but a time last summer, when everything was running smoothly, the output reached 130 tons per day. All parts of the furnace plant, except the boilers and blowing engines, have been designed to accommodate a lining with a 17 foot bosh, which would raise the capacity to 200 tons. Hence with very few alterations the capacity of the furnace could be doubled. The furnace is fitted with two cinder notches at opposite sides, one being used for hot cinders, the other for granulating purposes, for which a special plant has been added. This has also the distinct advantage that should one cinder notch be lost there is the other to fall back upon.

The cast house is 160 feet by 55 feet, and the bed is raised about 10 feet to the level of the furnace; the iron is cast four times in the 24 hours, at 9 and 3 respectively. The bulk of the iron made is No. 1 foundry, with a good open fracture and having an average analysis as follows: Silicon 3.76, sulphur 0.005, phosphorus 0.20, manganese 0.15 per cent. respectively.

Stoves.—The furnace is connected with three Roberts 2-pass hot blast stoves, 18 feet by 75 feet respectively, and are all fitted with valves of the latest design. Each stove has a heating surface of 18,500 square feet, which raises the blast up to a temperature of about 1,250 degrees F. The three stoves are used in rotation, changing every hour, so that when stove No. 1 is on blast, stoves 2 and 3 are on gas, or when 2 is on blast 1 and 3 will be on gas, and so on. Thus each stove has two hours on gas consecutively. Owing to the fact that the furnace is equipped with a Roberts-Whistler dust catcher, the gas conveyed to the stoves is practically free from dust, so saving many unnecessary close downs for cleaning.

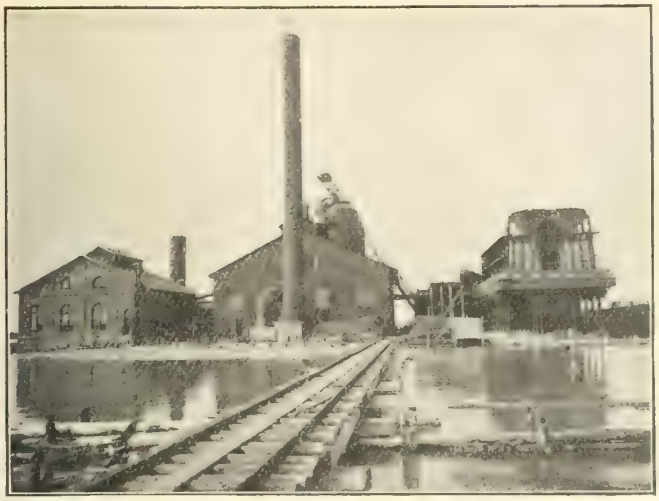
The Blowing Engines.—These were built by the Southwark Foundry & Machine Company of Philadelphia. There are two engines, which are horizontal disconnected compound of 600 horse-power each, with steam cylinders 32 by 54 and 48 by 54 inches respectively. These engines are fitted with air tubs 66 inches by 58 inches, and are so arranged that they take their air supply from outside the engine room. This is a great advantage, as it keeps the air free from steam, and also keeps the blowing room heated in winter time. Again, the air outside being colder, necessarily contains less moisture, hence the air blown to the furnace is much drier than would otherwise be the case. The total volume of air blown is nearly 30,000 cubic feet per minute from both engines.

The light and power for the plant is supplied by two 75 kilowatt dynamos connected to two Robb-Armstrong engines. Adjoining the engine room is the pump house, where two 2,500 gallon pumps and a jet condenser are installed, also two boiler feed pumps, all manufactured by the Canada Foundry Company of Toronto. The main blowing engines and large pumps are operated condensing. The dynamos and feed pumps exhaust into heater.

The boiler plant consists of four 225 horse-power Atlas water tube boilers, also built by the Canada Foundry Company. These boilers are specially set to use the water gases from the furnace, thus saving a high consumption of coal. Just sufficient coal is used to keep the gases ignited. For the four boilers only about 20 tons of coal are used per month.

Roaster.—On account of the iron ore used in the furnace containing such a high percentage of sulphur, it has to be roasted before being charged into the furnace. For this purpose a Roberts roaster has been added to the plant. This roaster is charged mechanically from the top and has a capacity of 400 tons per 24 hours; it is divided into sixteen sections of about 25 tons capacity each. Each section has a separate combustion and chimney chamber. The ore passes through the roaster by gravity and is heated to a temperature of about 1,500 degrees F. by a mixture of air and gas from the blast furnace, which is passed through it. The ore remains in the roaster about 24 hours. In its natural state the ore contains anywhere from 2 to 5 per cent. spulphur; but after roasting the sulphur is reduced to about 0.5 to 0.8 per cent. The mechanical draught for the roaster is maintained by two Sturtevant 12 foot exhaust fans.

The arrangements for the handling of the stock are extremely neat and satisfactory, one man being able to handle all that is required for the charging of the furnace. The stock is stored in a series of iron hopper bins, or pockets. These are raised on a steel structure to allow



Power House, Furnace and Roaster

for the loading of the scale car by gravity. A track runs over the top of these lines and the limestone and nace skip, as all the coke for the furnace is charged by measure and not by weight; hence the coke can be dropped straight into the skip. This saves much unnecessary handling. Underneath each bin is is a small trap door to allow the stock to enter an electric scale car or lorry. This scale car runs on a track alongside the head is lowered, the large bell is dumped, precipitating the stock into the furnace. In this way no gas escapes to the atmosphere, and greater uniformity of distribution is effected. The actual charging of the furnace is all operated from a small shed at the bottom of the furnace skipway. Here the tunnel head is revolved by an electric switch and resistance, and the valves are operated for the steam cylinders for lowering the bell. Here also is a mechanical device for testing weights for gauging the height of the stock in the furnace. All these and the electric scale car are operated by one man. Occasionally there is an extra hand for charging coke. The furnace top is visited but once a day for inspection, and any necessary oiling that may be required.

Coke Ovens.—The Atikoken Iron Company make all their own coke and for this purpose a battery of 100 ovens was built, producing about 130 tons per day. On account of the very flat nature of the ground and filling being at a premium the ovens were built on a concrete dock, supported on piles driven into the ground, to bring the ovens to the necessary elevation for loading into the railroad cars. It was at first feared that the ovens being built in this manner, the air would have a considerable cooling effect; but experience has shown that this is not the case, the draught making no appreciable difference.

The ovens were built adjacent to the coal dock of the Canadian Northern Railway Company. The coal is



C.N.R. Coal Docks and C.N.R. Elevator.

coke are unloaded direct from the railroad cars into these pockets. The coke bins are adjacent to the furstock bins, and on it is a tipping buggy which receives the necessary charge of stock, limestone or ore, weighs it and conveys it to the furnace skip, into which it is dumped and then hoisted to the furnace top. The charges of ore from the roaster are received in the same manner as the stock from the other pockets. Under each section of the roaster is a pocket and trap door and the ore is taken in rotation from these pockets—16 in number. It is so arranged that there is always a ready supply of roasted ore. After using ore from pocket No. 1, pocket No. 2 is used, and so on. Thus by the time the round has been made the ore in pocket No. 1 is ready for use. In photograph No. 1 the arrangement of stock bins can be clearly seen at the end of the trestle, and photograph No. 2 shows the separate pockets under the roaster. The stock is raised to the top of the furnace in two skips, operated by a steam hoist. The furnace is fitted with a Roberts revolving top. The charge of stock is dumped into the tunnel head, which is hung on rollers and may be revolved any multiple of a right angle by a small electric motor. After the required revolution has been given the stock, the tunnel head is raised, which allows the stock to fall from the small bell on the large one, the small bell remaining stationary. After the tunnel stored in large bunkers at the dock and transferred to the ovens in a hopper bottom electrical lorry. The Pittsburgh Coal Company supply the coal, which is mined at New River Fields, West Virginia, and is transported to the head of the lake by water.

The coal is of a very good coking quality, an average analysis running as follows:—Volatile matter 22.89, fixed carbon 71.89, ash 5.22, sulphur 0.69 per cent. respectively.

Nothing but 48 hour coke is made. The coke is dark, rather soft. This also shows up well by analysis:—



Section of Plant.

Volatile matter 3.71, fixed carbon 88.60, ash 7.69, sulphur 0.67 per cent. respectively.

The coke is loaded direct into railroad cars and switched to the stock bins at the furnace.

Flux.—For fluxing purposes a limestone from Kelley Island, Ohio, Lake Erie, is used. This is brought up to Port Arthur by water. It is a first-class stone and very clean, as will be seen by the accompanying analysis:—CaO 47.66, MgO 5.1, SiO_2 1.5, Al_2O_3 0.10, Fe_2O_3 0.30. This is an average of several analyses from stock pile.

The chemical laboratory is well equipped with all the necessary and latest apparatus for analytical work required in this industry. Adjoining the laboratory is the crushing room, where all the samples are prepared. It is well supplied with a good mixing table, crushers, bucking boards, also a small hand power drill for drilling the sample pigs. It was pleasing to note that particular attention has been paid to this department, which in many cases is sadly slighted. This department is under the able supervision of Mr. W. Benner. Great credit is due to Mr. Robert Jones, the superintendent, for the efficient manner in which he has superintended the construction of the plant. From the results obtained Mr. Jones has proved himself to be one of the foremost furnace men on the continent. Mr. Jones was previously with the Illinois Steel Company, South Chicago.

Mines.—The iron mines of the Atikoken Iron Company are 130 miles west of Port Arthur, on the Canadian Northern Railway. From the main line a spur runs north for three miles to the mine. The accompanying sketch will help to give some idea of the mine and relative positions of the ore deposits. There are three parallel veins striking east and west. At the bottom of the hill a tunnel 12 feet wide was driven in a northerly direction, and after cutting through 40 feet of rock ore of high grade was struck. This ore was cut through for 40 feet. The tunnel was continued at a width of 6 feet through another 60 feet of rock, when a second vein of ore was struck, but of poorer quality. This second vein proved to be smaller than the previous one, being only 10 feet wide. After another 15 foot rock a third vein was cut of a similar nature to the second, but a little larger, measuring 16 feet. The tunnel was then continued through to the other side of the hill a distance of 100 feet.

Deposit A is the only one being worked at present. Here ore has been stoped out to a height of 20 feet, and east and west of the main drift for 85 feet. Raises have been started at both ends. That on the west side is up 50 feet. When these two raises are through to the surface, underhand stoping will be tried. Veins B and C are both smaller than A and much broken up, showing more of a schistose structure. They are also lower in sulphur and higher in lime than A.

In physical aspect the ore is a fine grained, close comapct magnetite, showing fine seams and splashes of iron pyrites and pyrrhotite. Traces of calcite may also be noticed here and there in small veinlets. The ore has been traced on the surface for a distance of 4,000 feet and several estimates have been made as to ore in sight ranging up from five million tons. The present mining capacity is 200 tons per ten hour shift. The outfit of air drills consists of four No. 2 and eight No. 43 1-4 "New Giant," all from the Canadian Rand Company. Only the eight large drills have been in operation.

The main tunnel up to the first vein is 12 feet wide and has a double track. This section of the tunnel is the only part of the mine that is timbered. The veins are perfectly perpendicular and so far no other ground has been cut that requires timbering.

On the west side of the tunnel, at vein D, ore was struck, but not in quantity. Two open cuts were worked for a while to try and increase the output, but they have now been abandoned.

The average analysis of the ore shipped to the furnace for the last six months is as follows: Ore before roasting contains anywhere from 2 to 5 per cent. sulphur.

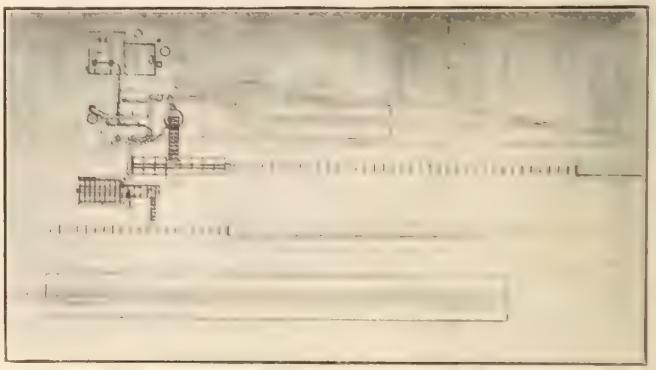
Ore Roasted:—Iron 60.06, silica 9.33, sulphur 0.16, manganese 0.12 per cent. respectively.

The ore is trammed out of the mine in 1 1-2 ton cars direct to a No. 6 Austen cone crusher with a capacity of 50 tons per hour. The crusher feeds direct to a bucket elevator, which raises the ore to a height of 30 feet and delivers it into 50 ton steel ore cars, which are brought up to the switch and then allowed to run by gravity to the elevator.



Hard Coal Shed, C.N.R. Coal Docks and Atikoken Iron Works.

In the power house, which is a wooden building 40 feet by 70 feet, and divided into three sections, is one-half of a Canadian Rand compressor, compound condensing class B, one 4 1-2 by 7 by 4 1-3 Fairbanks boiler feed pump, and one 750 horse-power Wainright heater.



General Plan of Works Atikoken Iron Company.

Steam is supplied by three 100 horse-power return tubular boilers, built by the Polson Iron Works, Toronto. The pumps exhaust into the heater, and the suction is direct from the Atikoken river, about 200 feet away.

A 50 horse-power Jenckes single high pressure engine is used for driving the crusher and elevator.

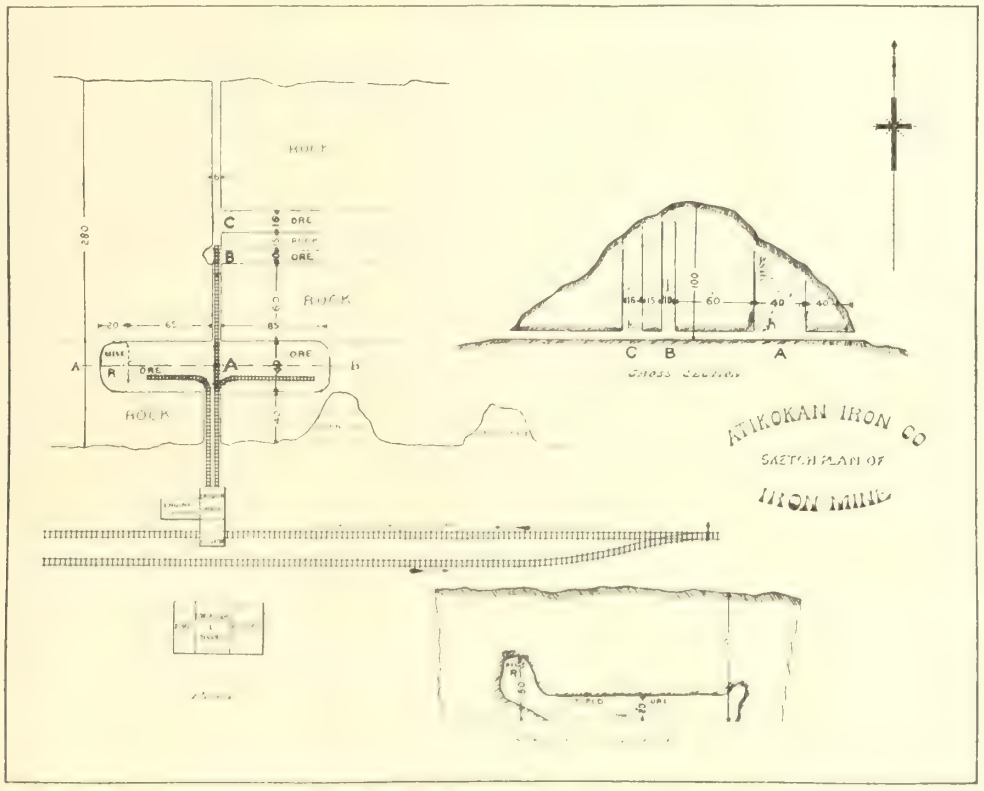
Preparation has been made for the installation of an electric light plant of 150 lamp capacity.

Labor of all kinds has been very scarce, only 65 men being employed at the mines. All the mucking is done by foreigners, chiefly Italians, and many of the machine men are Swedes. All work is done on day pay. The comfort of the men has been well studied. The boarding house is a large two storey wooden building 27 feet by 60 feet with an annex for a dining room. On the upper storey are bedrooms for mine superintendent, foreman, cook, etc., also the mines office. The men's bunk house is splendidly fitted up with iron bedsteads,

CHANGES IN ALASKAN MINING LAWS.

A copy of the new regulations governing filing of affidavits of work on mining claims has been received for publication. The law reads as follows:—

During each year and until after patent has been issued therefore, at least $100 worth of labor shall be performed or improvements made on, or for the benifit or development of, in according with existing law, each mining claim in the district of Alaska heretofore or hereafter located. And the locator or owner of such claim or some person having knowledge of the fact may also make and file with the said recorder of the district in which claims shall be situate an affidavit showing the performance of labor or making of improvements to the amount of $100 as aforesaid, and specifying the character and extent of such work. Such affidavit shall set forth the following:—



Atikokan Iron Mine—Sketch Plan of Iron Mine.

mattresses and blankets to accommodate 100 men. Other buildings at the mine are: dry house, 20 feet by 40 feet, and blacksmith shop 20 feet by 40 feet. The mining department is under the direct supervision of Mr. F. Rodder, M.E.

The mines started operation early in the year, and the furnace was blown in on Wednesday, July 17th, 1907. Everything worked to the entire satisfaction of the management. But for the financial depression that swept the country and the fact that it was so late in the season when the furnace was blown in that the western foundries had placed their orders elsewhere, the plant and mines would be in operation to-day. The furnace was blown out on Friday, December 13th, 1907.

It is expected that with the opening of navigation on the lakes operations will be resumed and continue "in aeternum."

First—The name or the number of the mining claims and where situated.

Second—The number of days' work done and the character and value of the improvements placed thereon.

Third—The date of the performance of such labor and of making improvements.

Fourth—At whose instance the work was done or the improvements made

Fifth—The actual amount paid for work and improvements, and by whom paid when the same was not done by the owner.

Such affidavit shall be prima facie evidence of the performance of such work or making of such improvements, but if such affidavits be not filed within the time fixed by this act the burden of proof shall be upon the

claimant to establish the performance of such annual work and improvements. And upon failure of the locator or owner of any such claim to comply with the provisions of this act, as to performance of work and improvements, such claim shall become forfeited and open to location by others as if no location of the same had ever been made.

The affidavits required hereby may be made before any officer authorized to administer oaths, and the provisions of sections 5392 and 5393 of the Revised Statutes are hereby extended to such affidavits.

Said affidavits shall be filed not later than ninety days after the close of the year in which work is performed.

Section 2. That the resources of the several divisions or districts of Alaska shall collect the sum of $1.50 as a fee for the filing, recording and indexing said annual proofs of work and improvements for each claim so recorded.

Approved March 2, 1907.

FUNCTIONS OF THE CONSULTING MINING ENGINEER.

By Allen Hastings Rogers.*

(Reprinted from the "Engineering and Mining Journal" of New York.)

There are many engineers in this country who call themselves consulting engineers, and as such they are prepared, as their title implies, to be consulted on engineering questions. Referring more particularly to the consulting mining engineer, his functions do not seem to be understood in their entirety in this country, and it does not appear improper to venture a short description of the service which he offers.

It is rarely that the consulting mining engineer is called on for any service other than the examination and valuation of mining property for prospective purchasers, but this, while one of his most important, is far from being his only field of work.

The examination and valuation of mining property for purchase is, of course, a very important work, and, since large amounts of money are usually involved, the engineer's position, as the representative of the purchaser, is one of great trust. But it is almost invariably for the purchaser that the engineer acts. Vendors of mines do not, as a rule, call upon the consulting engineer for a report on the basis of which to present their property. This, in my opinion, is a great mistake on the part of the vendor. For there is nothing that can awaken interest in an enterprise as much as a proper report on the property. Those commonly presented are worthless in that they fail to give much important information, and what is given is usually in such general form as to awaken suspicion as to its accuracy; in fact these statements often prove on analysis to be inconsistent and sometimes even contradictory. The width and assay value of the ore and the tonnage developed may be stated, but if, by chance, any detailed figures are given, they will generally be found to fail entirely to support the general statements.

Preparation of a Property for Sale.

No one is likely to spend several thousand dollars in the examination of a property, the description of which, on reading, leaves a feeling of distrust. Owners would further their own ends if, on offering their property for sale, they first invested a little money in a good report, accompanied by assay and other maps, thus showing that the property is worth the price asked. Besides, a great many owners have not the faintest idea how to value their mines and, for fear of selling too cheaply, put a price on them which is prohibitive, and thus spoil the chance of a sale. The consulting engineer, representing the vendor, is just as capable of fixing a fair price for sale, as when he represents the purchaser.

While the fixing of the proper price, at which the purchase of a mine is made, is of paramount importance to the ultimate success of the undertaking, nevertheless, as soon as the property has been purchased, its economical operation becomes of as great importance. The valuation at the time of purchase is made on the basis of certain operating costs. If these costs are exceeded through inexperienced or inefficient management, the enterprise has as poor a chance of success as if it had been purchased at an excessive valuation. In England it is thought to be fully as important to obtain the best advice concerning the operation of a mine (and, concurrently, of information as to ore reserves, condition, etc.) as regarding its valuation for purchase, and it is commonly the custom to retain, for advice as to operation, the engineer on whose recommendation the property has been purchased.

In this country such is not commonly the case. Even the big exploration companies maintain an examining staff separate from their operating staff, and it often happens that, after the mine is purchased, the costs estimated by the examining engineer are not realized when the operating staff takes hold, either because the figurs are impossible of realization, or because of incompetence on the part of the operating department. In the case of the independent companies, when the property has been acquired on recommendation of a properly constructed report by a competent engineer, the operation of the mine is often intrusted to an incompetent man and the examining engineer's recommendations are disregarded so that failure results, with, in many cases, unjust discredit to his judgment. This is mainly due to the desire of the directors to economize as much as possible, but also in some degree it is due to too much confidence placed in the so-called "practical miner." The desire for economy is laudable, but, when practiced at the expense of results, becomes folly, or worse.

Mistakes of Small Mining Companies.

Nowadays it comes pretty near being true in almost every line of work that a man's ability is measured by the salary that he earns, and, while no doubt appreciating this, the directors, of what we may call the amateur mining company, argue that, as their operation is small, they cannot afford to pay a high salary for the management of a property employing, perhaps, 25 men. So they place their property in charge of a low-salaried

*Mining Engineer, 82 Beaver street, New York.

man, who, perhaps, under competent direction may be well qualified to look after the details of the work, but who, without such direction, spends the company's money on such errors as driving long crosscut adits to gain hundreds of feet of depth on the strength of a surface showing, but little, if at all, explored; who sinks shafts 200 or 300 feet apart; who drives levels at 40 or 50 foot intervals or buys tramways, mills or smelters entirely unsuited to the ore or of a capacity entirely disproportional to the capabilities of the mine.

But the consulting engineer, by making two or three visits a year to such a property can direct, in a general way, the development and save the owners from such expensive errors. His charges for such service would be relatively small, as it would consume comparatively little of his time. The large companies, each operating a number of mines, place in charge of all their operations a high salaried man, who, by periodical visits and by correspondence during the interim, directs operations so that a much lower salaried man may be employed for resident superintendent. One of the advantages gained by consolidation in any branch of industry is that small constituent properties get the benefit of superior ability at small cost. But the small independent mining company can put itself in a position analogous to that of one of the mines of the big consolidation by retaining a consulting engineer.

Let us see what the consulting engineer would do under such circumstances. His work would be, according to the terms of his engagement, to act either as advisor to the board of directors or as non-resident manager. In the first case he gives advice, but only when called upon to do so, regarding any point which may be brought up. Such advice includes the decision as to the purchase of certain machinery or other equipment, the examination and criticism of an ore-selling contract, etc. Such service is rendered for a small retaining fee under much the same arrangement as lawyers are retained. In addition, it is frequently stipulated in such arrangements that the engineer may be called upon to visit the mine, if necessary to settle some question which may have arisen; in such a case a stated per diem rate, in addition to his regular retainer, is paid him.

Duties of a Non-resident Manager.

At the other extreme is the full management of the property with full responsibility to the directors. The engineer's duties under such an arrangement are the same as those of a resident manager except that the carrying out of the details of the work, which he plans, are left to a superintendent on the ground, who may thus be a low salaried man. He visits the property as often as the magnitude of operations and the speed with which the work advances require; he engages a man having his confidence as resident superintendent, who reports to him; he receives at frequent intervals reports and maps covering the progress of operations and so is enabled to issue instructions supplementing those given at his visits; he approves all important requisitions for supplies and equipment; he draws specifications for obtaining bids where necessary and, in fact, oversees in every way the operation of the property. He renders to the directors all information regarding the progress of operations and draws up for the annual meeting a report describing the work done during the year, the condition of the mine, the extent of the ore reserves and the outlook for the coming year.

The foregoing paragraph describes briefly the work of a number of consulting mining engineers in England but, except for the large companies, which take all the time of their general manager, I believe there are few such instances in this country. The number could be increased with profit to the mine owner. But the consulting engineer can be employed to cover any range of authority between none, as when he acts in purely an advisory capacity as described in the first case, and full authority as described in the last. I believe many people are ignorant that such arrangements can be made at reasonable terms, or if informed at all, they think it necessary to pay the enormous salaries we see occasionaly reported in the daily press.

Errors Avoided by Employing Non-resident Managers.

Although cited as one of the greatest errors which can be made in the development of a mine, one frequently hears of the erection of a mill or smelting plant before sufficient ore has been developed to warrant it. In a great many cases, even when the erection of a reduction works is warranted, the process or apparatus is entirely unsuited to the character of the ore, or the capacity is too large for the mine. There are two principal causes which tend to hasten the erection of a reduction plant—the desire of the owners to make the property pay and the desire of the machinery manufacturers to sell their goods. Both of these tendencies are perfectly natural. We cannot blame the owner for wanting to limit his investment to the smallest possible figure, nor for his desire to obtain dividends. He is perfectly right from his standpoint; the only error which he makes is that he decides to erect the mill on incompetent advice. Having decided to erect the plant, the catalogues of machinery companies furnish a variety of plans from which to choose and the machinery manufacturer does not inquire whether the plant which is ordered is properly adapted for treating the ore, nor whether there is sufficient ore to warrant its purchase and erection.

To avoid such errors, a mining engineer should be consulted. In the first place, he will tell the owner whether the condition of the mine warrants the erection of the reduction plant; whether the ore as then shown is likely to change its character with depth, and so render the mill erected for treating it valueless later; what process should be adopted for treating the ore, what capacity the plant should have, and furnish plans for the plant. If there is not ore enough developed to pay for the plant, it is folly to erect it, for the ore may give out. If the character of the ore is likely to change it would be foolish to build a plant until its permanent character is determined. The cost of this service is not excessively high and the insurance of success which it gives to the owner, instead of leaving the question to be decided by chance, is worth many times the cost.

In conclusion, then, it should be impressed on mine owners, directors and shareholders in mining companies that success is not largely a matter of chance, but that the surest road to success is to entrust the operation of the property to a man thoroughly qualified by technical knowledge, which has also been supplemented by a long experience. If they will employ such a man as resident manager, they are giving their property the best possible chance of a profitable outcome. But, if the operation is small, let them turn the technical management over to some well qualified consulting mining engineer as the next best course. Just as they would not turn the trusteeship of an estate over to a stockbroker's clerk, so they should not take the advice of the mine foreman when they invest large sums in adits, shafts or mills.

CHROME IRON MINING IN CANADA.

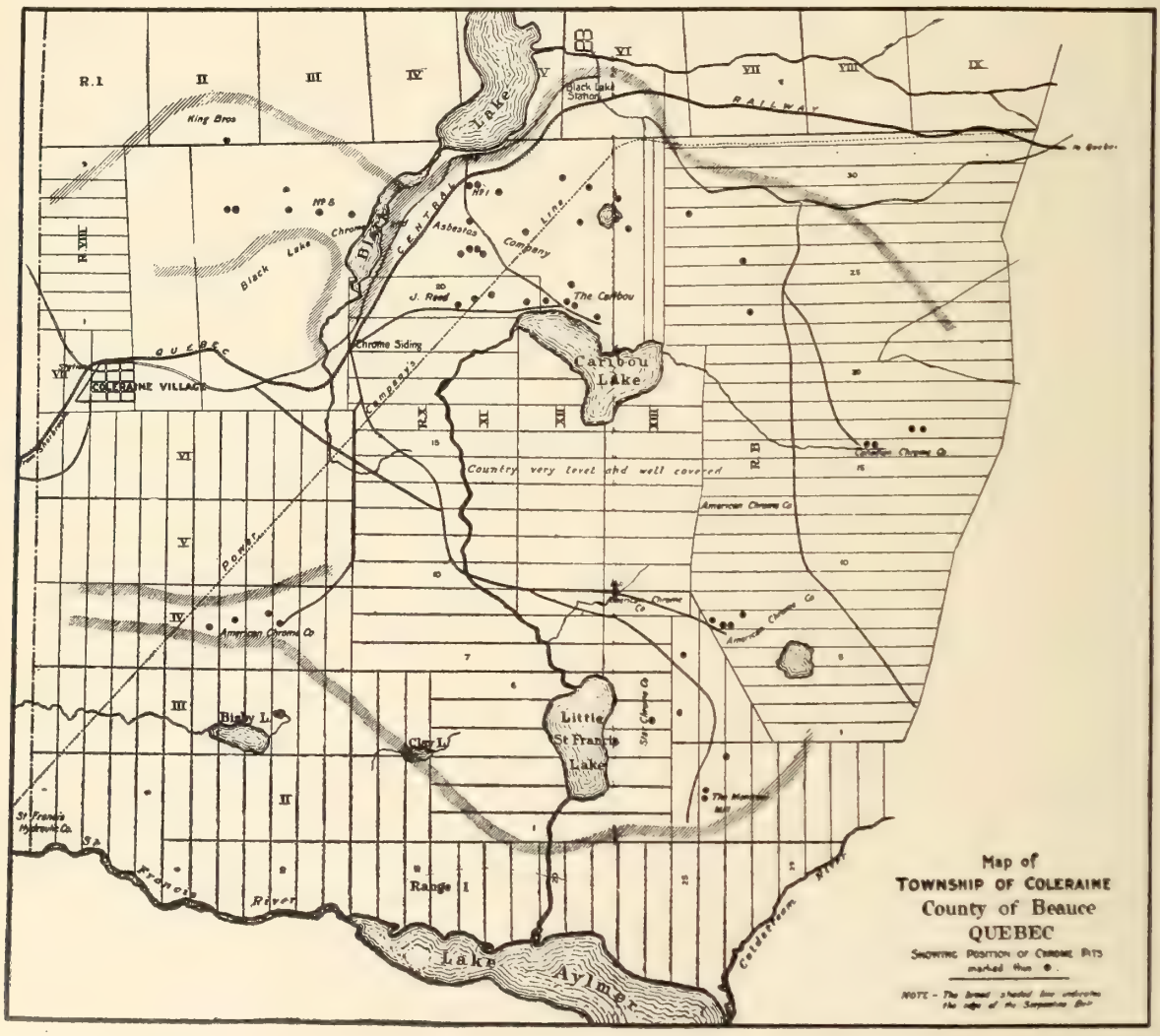
(A paper read before the Mining Section of the Canadian Society of Civil Engineers.)

BY H. F. STRANGWAYS.

Within the last few years there has been a large increase in the consumption of chromium in the Arts. This increase has been chiefly caused by the large demand for chromium salts in the tanning industry, to furnish a substitute for the acid in the tan bark, the increasing use of chrome brick for refactory purposes, and of ferro-chrome alloys for special steels. Chrome, however, is used, and is likely to be used in the future, to a much greater extent in the manufacture of chromium salts than for any other purpose.

Thetford, the distance from Montreal to Black Lake being 60 miles,

Chrome iron mining was begun in this region in 1894, and up to comparatively recent date, was carried on in a very spasmodic manner. The production up to 1898 amounted to a total of only 10,000 tons, while in 1905 alone it amounted to 7,600 tons, and in 1906 it had increased to nearly 9,000 tons. The greater portion of the ore shipped to the United States. Ore which is sufficiently rich to be shipped without concentration is termed



The Eastern Townships' deposits all lie in the region known as the "serpentine belt." The centre of the deposits is situated approximately at the little village of Black Lake, in the Township of Coleraine, but the productive region may be said to extend for a radius of about five miles from this village. All the districts from which chrome is now shipped, lie within ten miles of Black Lake. The Quebec Central Railway passes through this region, and none of the chrome pits are more than seven miles from the track. The journey from Montreal is made either by the Canadian Pacific Railway or Grand Trunk Railway, as far as Sherbrooke, and thence by the Quebec Central Railway to Black Lake, or

"Crude," and grades from 45 per cent. and upwards of chromic acid or sesquioxide. Concentrates also are shipped and paid for according to grade. The prices paid for both "crude" and concentrates vary between $9.00 and $12.50, the price depending on the grade or percentage of Cr_2O_3 contained.

In the earlier years of this industry in Quebec, there were large numbers of small producers, whose inability to keep their contracts, forced buyers to make their purchases elsewhere. The competition of the European and the New Caledonia ores, together with the irregular and pockety nature of the Quebec ore bodies, then being worked, was answerable for this state of affairs. Mining

was carried on by means of open pits, and all the ore was taken out as soon as it appeared. When the ore body punched out, as happened in most cases, there was no chrome ore forthcoming to enable the mine owners to keep their contracts; hence purchasers in the United States became disinclined to contract for Quebec ore, and in consequence the pits closed down, as either the uncertainty of finding more ore, or the dead work necessary to extract it when found, proved too great a handicap to the small producer.

The consequence is that at the present day there are, scattered all over this region, numbers of small pits from which crude ore has been taken and shipped, the pits themselves having been eventually abandoned. The success of chrome mining is due, not to mining men, but to those not immediately connected with the industry, and the credit for putting the industry upon a solid basis and establishing a reputation for the Quebec product should be given to Mr. J. N. Greenshields, of Montreal, who is the principal shareholder in the Black Lake Chrome-Asbestos Company.

GEOLOGY.

The geology of this region is rather complex, and it is only necessary to state that the chrome deposits all lie in what is known as the "serpentine belt." This serpentine represents the alteration of a peridotite, which was intruded through sedimentary rocks, probably of Cambrian age.

Chromite has been found only in peridotites and allied magnesium rocks, or in serpentine, which has resulted from the alteration of these rocks. It is true that there are alluvial deposits of chrome, but these can be traced back to the original peridotite rocks. The New Caledonia deposits are of this type.

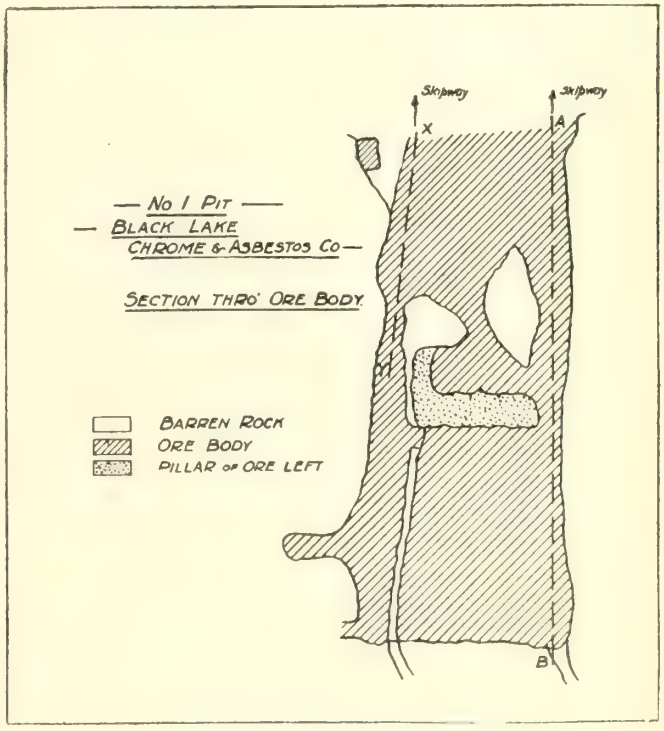
Up to the present time comparatively little investigation has been made into the origin of chromite deposits. The theory set forward by Pratt, Vogt, Adams, and others is, that deposits of chrome ore, wherever found, are segregations which have crystallized out from igneous magmas on cooling. Pratt, in 1899, in speaking of the North Carolina deposits, says: "My observations have shown that large deposits of chromite occur in the peridotite rocks, near the contact of these rocks with the enclosing gneiss. Also, that where there is but a small amount of chromite, either in pockets or crystals, these are more abundant near the contact and diminish in number towards the centre of the mass.

"The constant occurrence of the chromite in rounded masses of varying size near the contact of the peridotite with the gneiss, and its occurrence in the fresh, as well as in the altered peridotite, would indicate that the chromite was held in solution in the molten mass of the peridotite when it was intruded into the country rock, and that it separated out among the first minerals as this mass began to cool."

This theory of segregation can very well be applied to the Eastern Townships' deposits, as regards the proximity of the ore bodies to the contact.

Nearly all the pits which have been worked lie close to the contact between the serpentine and the country rock, which here is probably Cambrian. At No. 1 pit of the Black Lake Chrome Asbestos Company the actual contact, although covered, is not very far from the ore body; the contact in this case is betweeen serpentine and a chloritic schist. At the Caribou pit the geological relations cannot be obtained on account of the heavy covering of drift. At No. 5 pit the contact is close to the pit, being the same as that at No. 1. At the Montreal pit the contact is within 50 yards of the ore body; in this case it is between the serpentine and a later diabase which evidently was intruded at the point of original contact between the serpentine and the earlier sediments.

Even if the ore bodies were not near the contact the irregular and pockety nature of these deposits would lead one to accept this theory of segregation. The irregularity is further accentuated by an extensive fracturing and faulting which has taken place. The ore sometimes occurs as large masses of "crude," which gradually die away or disseminate into concentrating ore, and then passes to the barren rock. Sometimes, however, the "crude" will separate cleanly from the barren rock without any gradual transition, suggesting a possible re-arrangement by underground waters, although in most cases in which this happens the rock face will be found to be slickened so that this clean separation may more probably be due to the extensive fracturing and movement which has taken place, especially as



No. 1 Pit, Black Lake Chrome & Asbestos Co. Vertical Section.

such ore bodies represent a line of weakness along which movement would occur.

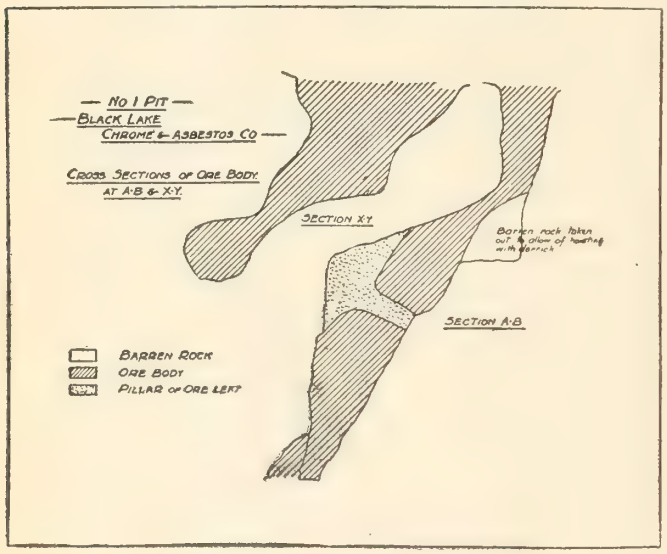
Slickensides are numerous in the serpentine, and the greasy, slippery rock face, which results renders mining operations dangerous.

The Canadian ore is produced principally by three companies Black Lake Chrome Asbestos Company, the Canadian Chrome Company, and the American Chrome Company. Of these the B. L. C. A. Company is by far the largest. In its extensive holdings the company has several chrome pits, only four of which have been worked to any great extent. These are No. 1, the Caribou, No. 5, and the Montreal. The company employs between fifty and seventy-five men when four pits are all in full working order.

No. 1 pit is the largest single chrome pit in Canada. It is admirably situated as regards transportation, power, and water facilities. The pit itself is about 1,200 feet to the south of the Quebec Central tracks; the siding put in to serve the pit leaves the main track about

one mile from Black Lake station. Power is furnished by the St. Francis Power Company, at reasonable rates. The water for the mill is obtained from Black Lake, which is distant some 400 yards.

The two sectional drawings which accompany this paper will serve to give some idea of the shape and size of the ore body at this pit. Originally there were three distinct ore bodies at the surface; one of these, shown to the extreme right of the section, was very small and soon pinched out; the other two were worked by an open cut to a depth of 70 feet. At this point both bodies showed signs of pinching out and the company expected to lose them altogether. The pit at the surface measures, roughly, 100 feet by fifty feet, which can be taken as the dimensions of the ore body at this point; at the 70-foot level, the width of the ore body is only 5 feet. However, on following this narrow strip of ore, it was found that both bodies took a sudden pitch as shown in the section, and then widened out considerably, the distance between the hanging and foot wall being as much as forty feet in some places. A single derrick served originally to hoist the ore from the pit, but on account of the pitch this method was abandoned. Before its aban-



No. 1 Pit, Black Lake Chrome & Asbestos Co. Vertical Section.

donment a considerable amount of barren rock was removed to permit hoisting with the derrick. A narrow band of barren rock separated both bodies from the surface down, and on account of the great width of the bodies beyond the point where the dip changed, it was deemed expedient to work each separately, leaving the barren rock as a pillar to support the roof. Two skip ways were put in and the ore hoisted in small self-dumping skips. The method used to extract the ore beyond the pitch was the same as in the open cut system. All the ore was taken out as it was found.

It was evident, however, as the pit increased in depth that measures must be taken to support the roof on account of the great distance between the hanging and foot wall. Accordingly on the 250-foot level, a large pillar of ore, some 16 feet in thickness, was left in, extending across the pit. The bodies were worked below this to the 340-foot level. In the meantime the company had bought a diamond drill and had begun exploration work in the bottom and sides of the pit. Finally the pit was considered too dangerous to be worked on account of several minor accidents which had occurred, and the company decided to close it down. This took place a year ago, and since then an incline shaft has been sunk starting about 40 feet to the left of the present pit. The shaft is a two compartment, one measuring 6 feet by 10 feet, inside the timbers, the inclination being 60 degrees easterly, which is the approximate dip of the pit. At present the shaft is 270 feet deep, and sinking is being extended. A considerable quantity of ore has been left in, at the pillar already mentioned, and a cross cut is being driven at the 250-foot level to extract this ore. Another cross cut will be put in at the 340-foot level, as there is a large quantity of ore in the lower part of the pit.

Diamond drill borings have proved the continuance of the ore below this level, and also indicate that the ore bodies have taken a pitch to the left or north and east. This is indicated in the section. As to the manner in which the ore which is left in the pit, and also that below the present level, will be extracted, the writer is unable to say. The equipment of the pit is not very extensive, consisting, as it does, of a five-drill Rand Air Compressor, driven by an induction motor, furnishing air for pumping, hoisting, haulage, and drilling. A new hoist, capable of handling 150 tons a day, is to be installed when the shaft is finished, and a large bin, discharging to a sorting floor under cover, has already been erected at the pit head.

SORTING.

A certain portion of the ore as it is mined is sufficiently rich to be shipped; this ore grades 43 per cent. (and upwards) chromic oxide, and is known as "crude." This proportion varies, but the average for this pit is about 15 per cent. of the total rock hoisted. The mill waste, or concentrating ore, varies in contents of chromic oxide from 7 per cent. to 40 per cent., and amounts to about 45 per cent. of the toal rock hoisted, and the rest, amounting to some 40 per cent., is dump material. Nothing, roughly speaking, under 7 per cent. is put through the mill. This necessitates a certain amount of sorting. Formerly each of the two skips dumped into a bin and the ore fell from the bin on to a platform on which it was sorted. The "crude" was still further cobbed at the siding. A great deal of trouble used to be caused on account of the freezing up of the ore in the bins in winter time, and on account of the difficulty of getting good men who would do good sorting, when exposed to the cold. When active operations are resumed all the ore will be hoisted from the shaft and dumped into one large bin, falling thence to a sorting floor. The material will be shovelled trough holes in the floor into the tramway cars.

THE MILL.

The mill is situated at the siding some 1,200 feet from the pit, and a tramway connects the two. The tramway is carried on a trestle throughout its entire length, thus in winter any trouble from snow is avoided. A small double cylinder hauling engine, with cars operated on a tail rope system, serves to deliver the mill ore to bins in the mill, which is 85 feet below the pit head.

The mill scheme is a simple one, being as follows:—

From the cars the ore is dumped into a 100-ton bin, falling thence to a 12 inch by 15 inch Blake crusher. From the crusher it is elevated to a shaking trough, which distributes the ore to the battery or feed bins. From the bins the ore is fed by Challenge feeders to the stamps, which, in this mill, number 30. The duty of the

stamps is in the neighborhood of 2 1-2 tons per day, their weight is 1,100 pounds, and the drop 8 inches, which, as the dies wear, increases to as much as 15 inches. The mortar has a double discharge, both back and front, and the screens are twenty mesh. Each battery of five stamps discharges its pulp directly through a pipe to a single Wilfley table, and each table makes three products—heads, middles, and tails. The heads are shovelled from receiving boxes into barrels and wheeled to the concentrate shed, and dumped there to drain. The bulk of these concentrates is large, amounting to as much as 15 tons a day, and two men are kept fully occupied in handling them. A drag conveyor was once installed for this purpose, but the wear and tear due to the hardness of the ore was so great that this method was abandoned.

The middles from all six tables fall into a launder, and are passed thence to a separate Wilfley table, which makes two products, heads and tails. These heads are of lower grade than the heads from the first six tables, and are put through the mill again. All the tailings flow from the mill to the lake. There is a difference in level of some 250 feet between the mill and the lake, and an electrically-driven pump supplies water to the mill. The power required for the mill and the machine shop is supplied by a 100 H. P. three-phase induction motor. The machine and blacksmith's shop are situated at the back of the mill.

The Caribou Pit.

This pit lies some two and a half miles to the south of No. 1, and a wagon road connects the two. A large quantity of "crude," of good grade, has been taken from this pit, but at the present time no work is being done in it.

No. 5 Pit.

This pit is situated on the west side of Black Lake, and is not being worked at the present time, although a considerable quantity of ore has been extracted from it in the past. The "crude" from this pit is of the highest grade of any found in the district, running as high as 56 per cent. chromic oxide.

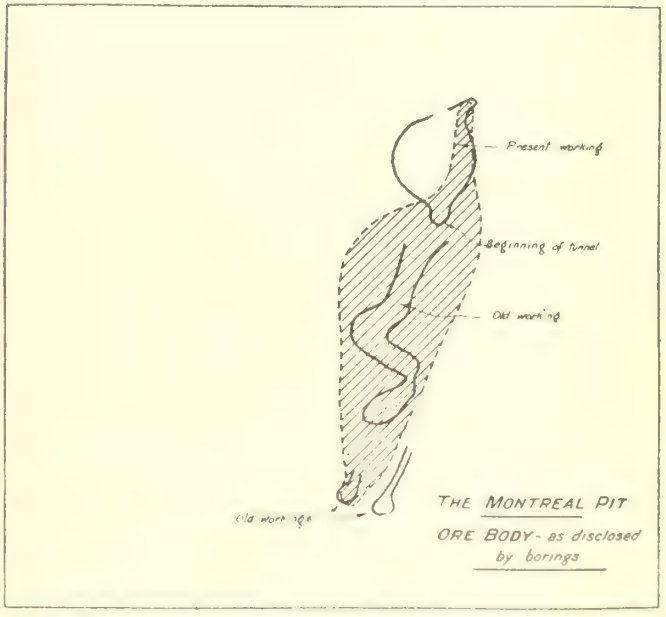
The Montreal Pit.

This pit was originally owned and worked by the "Eastern Townships Chrome Iron & Milling Company." It lies about seven and a half miles to the east of the railway, and a waggon road connects it with Chromem Siding, from whence all its ore is shipped. Chrome Siding is about one and a half miles to the south of No. 1 pit. At the present this Montreal pit, together with No. 1, are the only two out of the four which are being worked. This pit has its own mill.

Up to 1898 3,000 tons were taken from this property, and there was every indication of its being able to furnish many times that amount. Numerous outcrops of ore, from 12 to 15 feet in thickness, occurred along a length of some three hundred feet, but when worked were found to pinch out. Their position is indicated on the map by the outline of the old workings.

The present company took the property over two years ago, and since that time a considerable quantity of ore has been taken out. The company has also done some diamond drill exploration work, which has proved very satisfactory. The borings indicate the existence of a large body of chrome ore of the shape shown on the map. The size of the body as at present developed by the borings is 400 feet in length; with an average of 50 feet, while the thickness varies from 16 to 50 feet. There is a covering of barren rock some 50 feet in thickness over this body. The present output is maintained from the pit shown at the extreme left of the diagram. This pit, at the surface, measures, roughly, 80 feet by 50 feet; a depth of 50 feet has been attained, and a body of good ore is showing on the bottom and east sides of the pit. The ore disclosed by the drill holes is being taken out by a drift, which, at present, has reached some 50 feet, being in ore all the way. One of the drill holes has been pased, and the results given by the drill compare very well with the ore actually found.

The deposit will be mined probably by a room and pillar system, although no very regular system can be employed on account of the variation in the thickness. At present two boom derricks serve to hoist the ore from the pit. The ore is roughly sorted in the pit, and the large pieces of "crude" are hoisted separately and dumped at the surface in heaps, to be cobbed. The boxes in which the mill waste is hoisted are lowered on small trucks and conveyed by the tramway to the mill. The barren rock is hoisted separately and dispatched to the dump. The drills, hoists, and pump are steam driven, the boiler of the mill supplying the steam.



Sketch Plan.

The Mill.

The location of the mill is an admirable one, situated, as it is, on the hillside about 400 feet from the pit, and about the same distance from the lake. The mill scheme is the same as that at No. 1 mill. The ore is fed to a Blake crusher, falling thence to the battery bins. Fifteen stamps, in batteries of five, discharge the pulp through twenty mesh screens to three Wilfley tables. The middlings from these tables all go to a fourth, which makes lower grade heads and tails. These heads are re-fed to the crusher, and again passed through the mill. The tailings from all the tables flow to the lake. Two 45 H. P. flue boilers supply steam for both pit and mill, the fuel being cordwood. A single cylinder Corliss engine drives the mill and crusher.

A great deal of difficulty is being experienced in the transportation of the ore to the railway. Teams are employed for this purpose at present, but the method is costly and inadequate for the present output. The load is favored by the grade of the road, an advantage, however, which is off-set in wet weather on account of

the very bad state of the road, notwithstanding the fact that the road is constantly being improved by the company. An aerial tramway or narrow guage road for this distance of seven and a half miles would be impracticable on account of the first cost: probably the best means of transportation which could be employed would be either a traction engine or a motor lorry.

The Canadian Chrome Company.

This property is situated about four miles from Thetford, from which point all its ore is shipped. The company has opened up four small pits, all within a distance of 400 feet; only one of these pits is being worked at present, but it is by far the largest of the four, being some 100 feet to 125 feet at the surface, and 60 feet in depth. There is a small amount of "crude," and a considerable quantity of concentrating ore showing in the present workings. A single cable hoist, similar to those used in the asbestos pits, elevates the ore to a tramway, carried on a high tretle, and thence to the mill. One small vertical boiler supplies the steam for hoisting, pumping and drilling. All the hoisting arrangements will probably soon be changed, as the cable hoist at present used, commands only a part of the pit, and the steam supply is inadequate for the demands made upon it. The ore is conveyed on the tramway to the mill, dumped into a chute which feeds into a large Blake crusher, and is elevated from the crusher to the battery bins. The mill consists of twenty stamps, delivering pulp to four Wilfleys; the middles all go to a fifth Wilfley. The mill scheme is similar to that of all other mills in the district. Current is taken from the St. Francis Power Company's line to a 100 H. P. three-phase induction motor, which operates both the crusher and the mill.

The water supply for the mill is taken from a small stream about a quarter of a mile distant from the mill, an underground wooden pipe connecting the two. Two small dams at present serve to store a supply of water for the dry months; the lower of these two dams is to be raised six feet, as the reserve is insufficient. The transportation of the ore to the railway presents much the same difficulty as at the Montreal pit, although the distance is less, being but 4 miles to Thetford. A traction or motor lorry would probably afford a solution of this difficulty.

In conclusion, a few words on the concentration of these ores may be of interest. The present system of concentration has been in use practically since the beginning of the industry. Since the time when it was first used there have never been any radical changes, and it must be remembered that although the system is admittedly wasteful, it nevertheless possesses many advantages, chief among which are low first cost, and the simplicity of operation. The later advantage bore greater weight at the start than it would perhaps bear at the present day, as the labor had to be recruited from the vicinity, and experienced mill men would have been hard to find. Then, again, the uncertainty of the industry, both as regards the ore itself and also the market, told against any changes. The use of the Diamond Drill will undoubtedly greatly remove the difficulty of supply, as it will certainly help in development work. Once the question of supply is settled, definite contracts can be more easily made and kept, thus disposing of the market difficulty.

As regards crushing, in connection with this system, it is necessary, in order to produce a concentrate of high enough grade to ship, to reduce the ore to a size of about 20 measures to the inch. Certain experiments, performed by Mr. Patterson, under the supervision of Dr. Porter, M. Can. Soc. C.E., in the laboratory of McGill University, indicated that, with a 15-mesh screen, a larger total extraction could be made, although the grade of the concentrate was not improved. The practice at the mills, however, is to reduce all ore to 20-mesh.

One of the first mills in the district, installed at No. 1 pit, used graded crushing with jaw crusher rolls, and the writer believes, jigs, but these were replaced eventually by stamps and tables. It is very difficult to get information regarding this mill, on account of the time which has lapsed, but the scheme proved unsatisfactory, either on account of losses or else on account of the inability to produce high grade concentrates. Probably, as regards losses, the amount of fines made when rolls and crushers are used would be less than when stamps are used, especially as chromite is very brittle, and shows a great tendency to slime. However, in the experiments already referred to, it was found that the amount of slimes made when using a Huntingdon mill were more than those made by the stamps, using the same sized screens in both cases; and possibly the same may be found to be the case in a system using rolls. It is more probable that the simplicity of operation in the case of stamps, together with their small maintenance cost, as compared with the complications of a method using graded crushings, and as compared with the high cost of up-keep of such a system for screens, etc., were the deciding factors in the crushing arrangements of these mills. The mineral shows a great tendency to slime, so that if stamps are used the pulp should be driven out of the mortar as soon as possible; for this purpose heavy stamps, with a quick, small drop, a mortar with a low, double discharge both back and front, and plenty of water, are necessary. The present stamps possess these requirements, except perhaps as regards the water. From the stamps the ore passes without sizing to the Wilfley tables. Before dealing with the question of sizing one peculiarity in attempting the concentration of this ore, as compared with ordinary concentation practice, will be pointed out.

In most cases in which concentration is necessary to obtain a product of high enough grade either to smelt or ship, the mineral content is rarely over 5 per cent., and the variation in this content, although it may be as much as 50 per cent. of the original amount above or below the average value, does not affect to any great extent the ratio of the gangue to the mineral, as the gangue is so greatly in excess. In the case of chromite the percentage of mineral in the ore is large, and the variation in grade is excessive, the range being, roughly, between 7 per cent. and 40 per cent. chromic oxide.

Classifiers were used at the Montreal and No. 1 pits in previous years, but they have since been removed, as it was found difficult to keep them in adjustment. The reason for this was probably the irregularity of the feed, but there is no doubt that, given a good, steady head of water, and some good type of classifier, satisfactory results could be obtained in classifying the pulp before sending it to the tables.

The other alternative for sizing is the screen. Since the introduction of the Callow screen, many of the difficulties of screening fine material have been removed. The writer has never seen a Callow screen in operation, but understands that there is no doubt as to the possibility of its being satisfactorily used on fine material.

The irregularity of the feed would not altogether be removed, if either screens or classifiers were used, but

the tables could be more easily adjusted to take a particular size, whereas at present, with the irregularity of both grade and size on the tables, the smaller particles of chromite stand but little chance of being saved.

Sizing might, or might not, improve the grade of the concentrate, probably it would do so, and, at any rate, the extraction could be made greater.

The next difficulty in these mills is the re-treatment of the middles. All middles at present are sent to an extra table and two products are made, heads and tails. The tails from this table run exceedingly high, grading as much as 18 per cent. chromic oxide. The heads made are not of a sufficiently high grade to be shipped, and are put through the mill again. The object of re-constructing the middles and putting the resulting heads through the mill again is not apparent. A much better course would be to put either all the middles through the battery bins again, or to dump them separately and keep them for future re-treatment. They could be either crushed by stamps, using a finer screen, or reduced by means of some type of grinder.

The limit of values of losses in tailings may be put as between 3 per cent. and 7 per cent. A loss of 7 per cent. on a 40 per cent. ore would represent good work, giving a total extraction in the neighborhood of 82 per cent., while a 3 per cent. loss on a 7 per cent. ore would represent only an extraction of 57 per cent.

Actual figures are very difficult to obtain; but the extraction is probably in the neighborhood of 70 per cent.

INTERNATIONAL COAL & COKE COMPANY, COLEMAN, ALBERTA.

GEORGE A. OHREN.

One of the most up-to-date coal mining outfits in the Crow's Nest coal fields is that of the International Coal & Coke Company, situated at Coleman, Alberta, on the Crow's Nest Branch of the Canadian Pacific Railway, half way between Fernie, B.C., and McLeod, Alta. It is now four years since the first coal was mined on their property and tested in two temporary coke ovens to ascertain its coking qualities. It is needless to say that the coal was found well adapted to coking purposes and fully up to the expectations of those who were interested. Then the company was duly formed and active work began. In the last few years the mine has been brought up to a producing basis of 2,000 tons daily. Of this about 1,600 tons of the coal is sold to the Canadian Pacific Railway Company for fuel purposes, and the balance is used to make 300 tons of coke per day, which is sold under contract to the Dominion and British Columbia Copper Companies in the Boundary district.

Much to the credit of the management, it can be truthfully said that the extensive plans for mining operations and installation of the plant, which have always been conducted with an eye to the future and an increased production, have fully met the requirements of that increased production, without any unnecessary changes or delays; and, while the coal field has proved to be very extensive, all operations up to date have been conducted on two openings.

On October 7th last the directors of this company declared a dividend of two per cent., payable November 1st. Heretofore the company has been paying one and one-half per cent. The two per cent. dividend will amount to about $56,000, there being 2,800,000 of the 3,000,000 one doller shares issued and 200,000 shares still in the treasury. The total dividends paid by the company up to date amount to around $154,000.

At the present time the company is executing development work on another of the rich seams which traverse the property. It is estimated that when this new seam is opened up and coal is being mined therefrom it will be possible to bring the output up to 3,000 tons per day. In addition to this work and the regular mining operations the company is building snok sheds over all of their railway tracks to facilitate the transportation of their product in the vicinity of their property. They are also building twenty new cottages for the accommodation of the coal miners, and an extension to the railway side track at Coleman, three-quarters of a mile long, all of which goes to indicate the spirit of advancement that prevails about the place.

It is estimated that at the present time there are 3,000,000 tons of coal developed on the property, and approximately 50,000,000 tons in sight. The measures are located in the Cretaceous and Laramie-Cretaceous formations, and are part of the extensive Crow's Nest field. From the point of the openings of the seams the mountain rises gradually, until at the face of the entries now being driven there is a height of coal of 1,200 feet.



View of Tipple I. C. & C. Co., Coleman, Alta.

Quite a little town has sprung up around the mines at Coleman, and there are now about 1,500 souls residing there. In the way of modern improvements they have a local telephone system, waterworks, carrying 140 pounds pressure, electric light, bank, churches, school, etc. Five hundred and thirty-five of the residents of Coleman are employed by the International Company, the last pay roll amounting to approximately $45,000.

The coal is of a bituminous grade and is coked in 176 bee-hive type coke ovens. These ovens are built 14 feet in diameter by 8 feet high.

The president of the company is Mr. A. C. Flumerfelt, Victoria; vice-president and manager, H. N. Galer, Spokane, Wash; secretary, W. G. Graves, Spokane; superintendent, G. L. Fraser, Coleman; purchasing agent, D. P. Oliver, Coleman; directors, A. C. Flumerfelt, H. N. Galer, D. M. Royers, D. Shultz and C. S. Houghton.

The labor situation at Coleman is all that could be asked at present. Perfect harmony prevails between the men and management. The men are working under a two years' contract, and it is not expected that there will be any interruption of operations during the life of this agreement. Average day's pay for inside work during the year 1906 was $4.85 a day. Outside common labor is paid $2.50. Machinists, engineers, carpenters, blacksmiths and other skilled laborers are paid from $3 to $4 per day.

The company has just completed a commodious wash and change room for the men. This room is 30 feet by 82 feet, with office, private baths and surgery. It is heated with steam and furnished with hot and cold water. There are 20 shower baths and expanded metal lockers in which each man can lock up his clothes.

The coal is loaded into the railway cars by an Ottumwa box car loader. The tipple has a capacity of handling 1,500 tons in ten hours. It also has a storage capacity of 3,000 tons—2,000 tons of coarse coal and 1,000 tons of slack. The slack is carried to the coke ovens by two six-ton Larry cars, electrically driven.

The total length of the main entry in No. 2 seam is 9,000 feet; that in No. 4 seam is 7,000 feet.

The 800 horse-power required to operate the machinery about the mine is derived from four 125 and two 150 horse-power boilers. The steam from these boilers operates a 4-stage Rand high pressure compressor with a capacity of 750 feet of free air per minute compressed to 1,000 pounds to the square inch. This high pressure air is stored in a pipe line reservoir and is principally used to drive three 6 inch by 10 inch and two 5 inch by 5 inch compressed air locomotives, the capacious storage tanks of which are charged from the pipe line with air at about 750 pounds pressure and which is in turn supplied to the cylinders through a small auxiliary reservoir at a much lower pressure.

The surface workings consist of a boiler house, power house, containing two 400 horse-power electric generators and the compressor; fan house, containing an electrically driven Capell fan, supplying 125, to 160,000 cubic feet of air; lamp house, containing 500 Wolff lamps; machine and blacksmith shops combined; store room, containing an average of $30,000 worth of fittings and supplies; stable, granary, etc.

While I do not know exactly what it costs the International people for their coal and coke, I can say that it costs about 90 cents to $1 per ton to mine and place coal on the cars in Crow's Nest district; coke costs most of them about $1.50 to $1.75, f.o.b., shipping point. The coal is sold at an average figure of $2 per ton for run of mine, and eupwards, depending on size of contract, and the coke at about $2.50 per ton and over at the mine. These figures are only approximate and conditions at different mines may alter them.

The future outlook for the Crow's Nest coal mines is good. They have a large market in Alberta and the other Eastern Provinces, in British Columbia, and a good market for their coal and coke in the States of Washington, Idaho and Montana.

THE PRODUCTION OF COPPER IN THE UNITED STATES IN 1906.

A Review of L. C. Graton's Paper, "The Mineral Resources of the United States."

The world's production (smelter output) of copper in 1906 was 1,596,973,700 pounds. In the fololwing table it is seen that the United States produced 57.47 per cent. of this, or about the same as the previous year. It is interesting to find Canada standing seventh in the world's copper producing countries:—

Country	Pounds
United States	917,805,700
Mexico	135,800,000
Spain	105,055,200
Japan	95,737,600
Australasia	81,200,000
Chili	57,668,800
Canada	57,030,400

The total ore treated in the United States was 19,743,000 short tons. The average yield of copper was 2.15 per cent. This tonnage includes certain ores which were mined and treated primarily for values other than copper. Leaving these ores (amounting to, 1,700,000 tons) out of consideration the average yield of copper was 2.5 per cent. The native copper ores of Michigan ran only 1.26 per cent. Excluding these the remaining copper ores gave an average of 3.65 per cent.

The ores mined primarily for copper yielded 0.015 ounce of gold and 0.882 ounce silver per ton.

About 26 per cent of the total ore tonnage was of "sufficient richness or of such favorable metallurgical character as to be smelted without concentration. The remaining 14,722,000 tons were concentrating ores, from which were produced about 2,985,000 tons of concentrates, the average concentration being slightly under 5 into 1. If the immense tonnage of milling ores of Michigan is excluded, the concentrating ores of the rest of the country exceeded the smelting ores by only a small tonnage."

Almost 75 per cent of the copper produced in the United States, first passes through the stage of copper matte, which is then further concentrated by converting or bessemerizing it into "blester" copper. Nearly 95 per cent. of the latter is subjected to electrolytic refining, both to recover the gold and silver that it contains and to remove deleterious elements. Of the three stages, mining, smelting and refining, in the transformation from copper ore to pure metal, it is the refined product which possesses most significance to the dealer and consumer, "the production of mines and smelters indicating possibilities of future months rather than final results accomplished to date."

The writer points out that copper mines in general do not fall in the class of "poor man's mines," so that it has happened that the most important copper mines in the United States are in the hands of strong companies. In 1906 four operators produced 720,000,000 pounds. These were: The Amalgamated Copper Company, the Calumet & Hecla Mining Company, W. A. Clark, and Phelps, Dodge & Company.

"Production at the principal mines is on a truly enormous scale, with ore tonnage and copper output of individual mining units ranging up to more than 2,000,000 tons and 100,000,000 pounds, respectively, with single milling plants of a daily capacity up to 8,000 tons, and with smelting plants turning out annually

90,000,000 to 175,000,000 pounds of copper each. To the magnitude of these operations almost as much as to the abundance of her natural resources, does this country owe her pre-eminence as a copper producer, with a record of over half the world's production" .

C. W. K.

TREATMENT OF LOW-GRADE COPPER ORE.

JAMES PARKES, B.A.Sc.

The occurrence of many deposits of low grade copper ore between Sudbury and Sault Ste. Marie, as was stated in the issue of February 1st, 1908, of THE CANADIAN MINING JOURNAL, as well as some promising ones between Sudbury and North Bay, opens up a wide field for reduction works that will enable the mining companies to dispose of their ore.

The development work done on any of these deposits does not justify the expenditure of the large sum required to erect reduction works on the property. It is obvious, however, that this low grade ore, unlike the rich ore of Cobalt, cannot be shipped to other parts of Canada or to the United States for treatment, but must be treated fairly near the district in which it is mined.

It might be supposed that the excessive freight rates might be avoided by concentration at the mine and shipment of the enriched product. However, the concentration would involve enormous loss of mineral and the method has yet to be discovered by which this loss may be avoided.

Granted, therefore, that the ores must be treated in the district, it is necessary to examine the character of the ore and the mining conditions in order to determine the method best suited to meet these circumstances. The methods which suggest themselves are the smelting or fire process, and the lixiviation or wet process.

In order that an ore may be suitable for smelting it must, especially if low grade, be self-fluxing, or nearly so. Cheap fuel must also be obtainable. These ores, running usually from four to five per cent., have neither of these advantages. They almost invariably consist of copper pyrites with a gangue of quartz and iron pyrites. The large amount of fluxes required to smelt such an ore, together with the high cost of fuel, make direct smelting prohibitive. If first concentrated, the enriched product would still be difficult to smelt, while the heavy losses occurring during concentration would also add to its unfitness.

In the lixiviation process two conditions are most important. The gangue must be fairly insoluble and the valuable mineral easily soluble, or at least of such character that it may be converted into a soluble condition. It will readily be seen that an ore with copper pyrites as the valuable constituent and the quartz and iron pyrites as the gangue, fulfills both conditions. The quartz vein matter is almost completely insoluble, while by roasting the iron pyrites is converted into the oxide and rendered fairly insoluble in dilute acid or any other solution that may be employed. By roasting the copper pyrites is made easily soluble in very dilute acid, in fact the greater part of the values may be extracted without the addition of any acid whatever. Another important fact about this process is that the fumes evolved in the roasting of the pyrites may be condensed, thus supplying all the acid required for the lixiviation. It might also be added that the cost of erecting such a plant would be almost fifty per cent. less than that of erecting a smelter.

The only company that is as yet working along these lines is the North Ontario Reduction & Refining Company, Limited, at Sturgeon Falls, Ont. They will dissolve the copper according to the method already outlined and precipitate electrolytically. An alternating method of precipitation is afforded by the well-known action of scrap iron on copper in solution. The iron which nearly always exists in the solution will be precipitated and sold as a pigment, thus making a valuable by-product out of what would be thrown away in any other process. By this method all the silver and nearly all the gold, which might exist in the ore, would be thrown into solution and collected from the bottom of the precipitation tanks. The tailings by the addition of Portland cement form an admirable concrete, and would be valuable for road building.

The importance which the treatment of these low grade copper ores bears to the prosperity of Northern Ontario leads the writer to suggest it as a profitable subject for discussion by the contributors to THE CANADIAN MINING JOURNAL.

BOOK REVIEWS.

THE METALLURGY OF IRON AND STEEL. BY BRADLEY STOUGHTON, B.S., PH.B., ADJUNCT PROFESSOR OF METALLURGY, SCHOOL OF MINES, COLUMBIA UNIVERSITY. 500 PAGES, 6 x 9. PROPERLY ILLUSTRATED. $3.00 POSTPAID. HILL PUBLISHING COMPANY, 505 PEARL ST., NEW YORK.

There are two errors into which the writer of a scientific text-book is prone to fall; the error of indulging in excessive detail and the converse mistake of omitting explanations that are essential to those for whom he has written.

Mr. Stoughton appears to have avoided both these pitfalls. His aim has been to prepare a text-book adapted not alone to college work, but to the needs of the civil, mechanical, electrical, metallurgical and mining engineers. There are, of course, incidental shortcomings. But, in the main, the author has accomplished his object. He has contributed to the literature of iron and steel a needed and valuable volume.

The first chapter is taken up with definitions of cast iron, steel, and their various commercial modifications. Here also is given a list of general text-books, reference books and periodicals on the metallurgy of iron and steel.

Chapter II. outlines the manufacture of pig iron. Blast furnace fuels and fluxes are described. The varieties and distribution of iron ores are noted. The deposits of the United States are mentioned, along with notes on transportation and mining. The handling of raw material at a modern furnace and the blast furnace itself are the next subjects touched upon. The following sections on smelting practice and chemical reactions are particularly good. In a paragraph on dry blast, J. E.

Johnson's ingenious explanation of the great economy effected by desiccating the blast is referred to. Allusion is made to the skepticism with which the results of James Gayley's innovation were received. The apparently disproportionate saving in fuel and improvement in practice are explained by showing that every blast furnace has a certain "critical temperature," below which it will not perform any smelting, and that the theoretical temperature of combustion of the smelting zone is only a little above this "critical temperature." The standardizing of the air blown into the furnace by the removal of moisture, which otherwise enters in large fluctuating amounts, increases the interval between the critical temperature and the temperature of combustion, and thus renders more heat available.

Further details of furnace accessories are succeeded by four pages devoted to the calculation of a blast furnace charge. Here the author has skillfully simplified the usual methods of calculation. Whilst the method given is largely empirical, yet the functions of each constituent of the charge are made sufficiently clear. Possibly the introduction of a few standard factors would have enhanced the value of this section.

The succeeding chapter, Chapter III., is unique. It is entitled "The Purification of Pig Iron." As an introduction to the fuller treatment of the Bessemer process, open-hearth practice, puddling, etc., it sketches in a masterly way the relations of these processes to the blast furnace and to each other. Short as this chapter is, it gives a better idea of these branches of the iron and steel industry than I have found in any other treatise. It is supplemented by a list of references to standard works.

The manufacturing of wrought iron and crucible steel, the Bessemer process, the open-hearth, the mechanical treatment of steel, iron and steel founding, the solution theory of iron and steel, the constitution of steel, and cast iron, malleable cast iron, heat treatment, alloy steels, corrosion, electro-metallurgy, and metallography are treated in the remaining chapters.

The last chapter, within the limits of thirty pages, gives a very condensed statement of the basic principles of chemistry and physics. The author's intention is to convey to the reader, who has had no grounding in these sciences, a working knowledge of both. This, obviously, is an attempt at the impossible. Still the chapter will serve the purpose of refreshing memories grown rusty from disuse.

Mr. Stoughton is not merely an academician. He has occupied responsible positions with manufacturing concerns. Hence he writes with freshness and vigor. He has endeavored to describe and co-ordinate all the branches of the manufacture of iron and steel. To say that he has not failed is praise. But Mr. Stoughton merits more than this. His book outranks any extant text-book upon the metallurgy of iron and steel. Its plan is broad and comprehensive; its execution is satisfactory.

MEN WHO SELL THINGS — BY WALTER D. MOODY. A. C. McCLURG & COMPANY, CHICAGO.

A crisp, readable book. Those of our readers whose vocation is the selling of mining machinery and supplies, or the products of mines and smelters, will find here much good, practical advice. Whilst the book is replete with commercial colloquialisms, it is not otherwise inelegant in diction.

MARTIN'S MINING AND WATER CASES OF BRITISH COLUMBIA, WITH STATUTES—BY THE HONORABLE MR. JUSTICE MARTIN, OF THE SUPREME COURT OF BRITISH COLUMBIA, AND THE JUDGE IN ADMIRALTY FOR THAT PROVINCE. VOLUME II. PART II. PRICE, $7.50. THE CARSWELL COMPANY, LIMITED, TORONTO.

In Volume I. and in this and the preceding part of Volume II. are to be found all the reports of Mining Cases and of Water Clauses Consolidation Act Cases of British Columbia from the earliest time up to January 1st, 1908, in all the courts and from the trial up to the Privy Council. Here also may be found all the mining statutes of practical utility covering the same period. In addition to much other information, we notice all the reported Yukon Mining Cases decided by the Supreme Court of Canada.

In this part of Volume II. the interesting case of the Star Mining & Milling Company v. Byron N. White Company is summarized.

EXCHANGES.

Science and Art of Mining, January 25th.—In an article on "Roof Action in Long Wall Work" the writer states that "the roof near the working face may be conveniently divided into three zones: (1) The dead roof; (2) the moving roof; (3) the pulled roof." Two essentials to the success of long wall work are, that all timber should be withdrawn behind the face timber; that the cogging should be made as compact as possible, the front wall rocks being bedded in loose material that will fill all crevices, and the insides completely filled. Of the moving roof the following analogy is made:—

The total action of this moving roof may be compared to that of a cantilever; that is, a beam supported at one end, but free at the other. One end of the cantilever roof is on the coal, the other on the yielding timber and cogging. Due to the great weight of the absolute roof this cantilever is constantly being broken (that is, pieces, so to speak, are being broken off its free end), and it is one of the essentials in successful working that these fractures should not take place at the working face, but that the weight should be what miners commonly call a travelling weight, ever and ever being rolled back on to the solid coal.

PERSONAL AND GENERAL.

Mr. W. A. Carlyle is making a thorough examination of Le Roi mine. He will not leave for London until late in March.

Mr. James Monroe, a successful Yukon pioneer, came to Winnipeg with the Dawson curling team to compete at the Winnipeg bonspiel.

Dr. Winthrop Spencer, F.G.S., who occupies a leading position among geologists, visited his native town of Dundas, Ont., last month.

Mr. Frederick Bolton, who had considerable interests in the Manitou gold district of Ontario, died recently in Blackpool, England, aged 61 years.

Mr. J. E. Jones, of Camborne, B.C., has been appointed official liquidator for the Silver Dollar mine and mill, owned by the Elwood Tin Workers Gold Mining Company.

Mr. J. A. Robertson succeeds Capt. Harris as manager of the McKinley-Darragh. Mr. Robertson was formerly with the Diamond Drilling Company.

Mr. Frederick Norton Coombs, a well-known mining engineer, largely interested in Cobalt properties, was found dead in bed in his apartments in Buffalo on February 9th.

Dr. Henry T. Bovey, Dean of the Faculty of Applied Science of McGill University, Montreal, has been appointed Rector of the Imperial College of Science and Technology, London, England.

The engineering department of Manitoba University, Winnipeg, was opened on February 10th, Prof. E. E. Brydon-Jack delivering the inaugural address, dealing with the work of the engineer and the progress of engineering education.

Mr. Malcolm Stewart and Mr. John Dorsey, underground managers of Sydney No. 1 colliery of the Dominion Coal Company, were instantly killed on February 13th by the fall from the surface of the steel cage used in sorting coal.

Mr. T. T. Fulton, of the Londonderry Iron & Mining Company, Londonderry, N.S., has left for Bathurst, N.S., with a staff of assistants. Mr. Fulton will survey and prospect the Bathurst iron ore properties of the Drummond Mines, Limited.

Mr. J. Dix Fraser, formerly superintendent of the Dominion Iron & Steel Company, has been selected by the Dominion Coal Company, as their representative on the Conciliation Board appointed to adjust matters between the Coal Company and their employees.

Mr. Joseph Irwin, of Ottawa, managing director of the Western Canada Cement & Coal Company, recently established at Exshaw, Alta., Mr. Frank Dunsford representing the English stockholders and Mr. Mackinnon appointed resident manager, arrived at Exshaw February 10th in connection with the starting of the works.

Mr. A. W. Robinson, M. Can. Soc. C.E., of Montreal, sailed from New York February 26th, having been commissioned to examine and report on the River Niger with a view to improvement of navigation by dredging. He has also in hand the design of dredging plant for the extensive improvements on the Upper Nile, which the Egyptian Government are entering upon for irrigation purposes.

The Robins New Conveyor Company, which has been recently incorporated, will be operated under the management of Thomas Robins, who founded the Robins Conveying Belt Company in 1896, and was president of that concern until March, 1907, when its management passed into other hands. The position of chief engineer in the new company is filled by Mr. C. Kemble Baldwin, who has served in the Robins Conveying Belt Company in the same capacity for the last seven years. The officers of the company are at 38 Wall street, N.Y., and 1240 Old Colony Building, Chicago.

A hard coke, with about the heating value of coal, and a half-formed coke, soft and burning freely, are made by distilling peat at Bodkino, Russia, 25 or 30 tons each being produced daily by eight furnaces. Having little sulphur, the fuels have an advantage for iron-making. The gases distilled off are burned in the furnaces, and the tar and ammoniacal by-products are valuable.

CORRESPONDENCE.

[The Canadian Mining Journal is not responsible for opinions expressed by contributors to this department.]

Editor's Note.—We have received many letters from subscribers, some of whom have approved and some of whom have disapproved our attitude in matters affecting the Canadian Mining Institute. Mr. Hill's letter is the first sent us for publication. As may be gathered, without difficulty, Mr. Hill holds that the Journal has erred. Our position has been well enough defined to require no further explanation. Therefore we print Mr. Hill's letter without further comment.

Nelson, B.C., Febrary 7th, 1908.

To the Editor, Canadian Mining Journal,
Toronto, Ont.

Sir,—It is unfortunate that certain members of the Canadian Mining Institute should have commenced a most uncalled for and unwise agitation against certain officials of the Institute. I have just received a circular signed by M. J. C. Murray, in which I find the following:—

> "It is believed that the movement to fill these two offices with technical men will appeal to all members of the Mining Institute."

Now I would enter a most emphatic protest against this assertion. A technical education does not qualify a man for the work of a secretary or of a treasurer. There are, of course, exceptions, but as a rule the higher the technical qualifications of a man the less fitted is he for secretarial or business work.

In this particular case it seems that the present Secretary of the Canadian Mining Institute, Mr. Mortimer Lamb, and the Treasurer, Mr. Stevenson Brown, have filled the positions of Secretary and Treasurer with credit to themselves and to the satisfaction of the officers of the Institute. The circular signed by the President and four Vice-Presidents of the Institution is ample testimony to this, and should be sufficient for all unprejudiced members of the Institution. The membership has been largely increased, the finances are in good shape, and a large number of valuable papers have been contributed by members and printed in the transactions. It seems to me a mean, dishonorable thing to agitate for the dismissal, without adequate cause, of officials who have done good work for the Institute, and I trust that the members of the Canadian Mining Institute will not countenance such action.

Whether the offices of Secretary and Treasurer would be better filled by technical or by untechnical men may be a matter of opinion, but I think there can be no doubt that these dissensions among the members of the Institution, these agitations by cliques, are very detrimental to the best interests of the Institution. If the Canadian Mining Institute is to be the influential and successful institution, which it ought to be in a mining country like Canada, the members must all work together for the good of the Institution and must loyally support the Council and officers of the Institution.

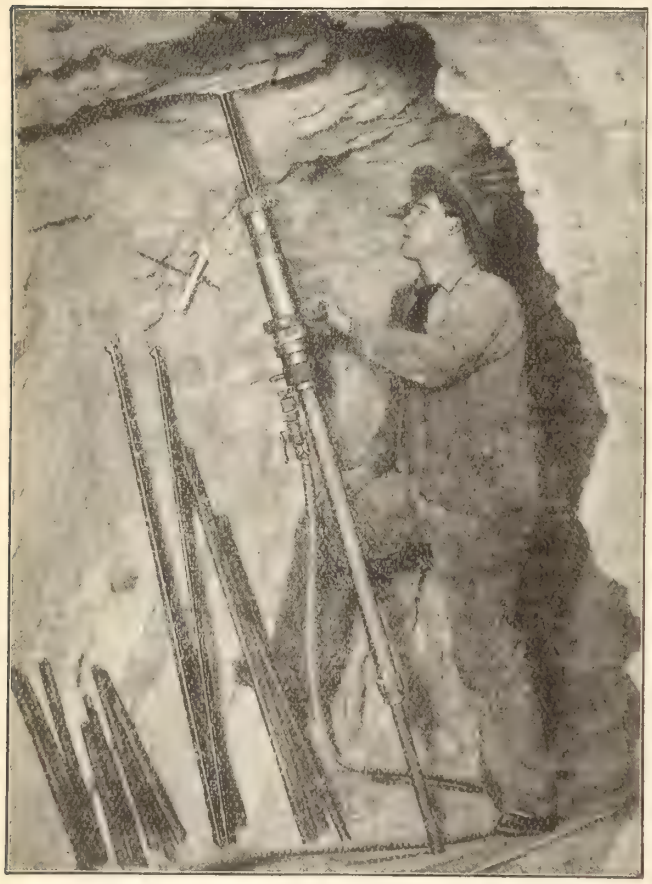
Trusting that you will find space for this in your paper, I am yours faithfully,

Leslie Hill.

MINING MACHINERY NOTES.

The Sullivan Hammer Drills for Mining Work.—large pneumatic rivetting or chipping hammer. In its operation it differs from the ordinary machine drill in that the bit is held against the rock, and the hammer hits the shank end of the steel twelve hundred or more blows per minute. The drill is rotated by hand. For up-holes an air piston supports the machine and feeds it automatically. On flat and down-holes the operator feeds by hand.

For overhead work in stopes and raises; for special sinking operations; and for trimming, cutting hitches, and drilling pop-holes the hammer drill has been proved superior to the ordinary reciprocating machine drills.



Sullivan "D-21" Hammer Drill in operation.

For usual sinking work and for drifting this is not the case.

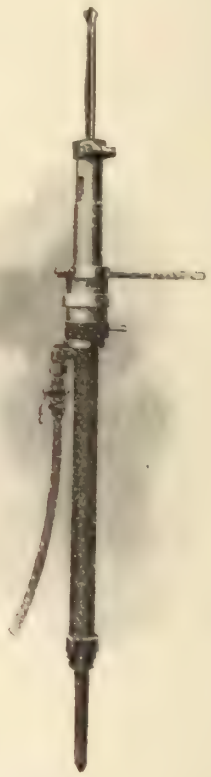
In stoping out narrow veins, the lightness and compactness of the hammer drill are obviously advantageous. No tripod column or other mounting is required. They can be handled by one man and can be carried anywhere by him. Their flexibility enables the drillman to place his holes so as to ensure economy of time and powder. Time is saved, also, in changing steels, as a new length can be inserted almost instantaneously.

The "D-21" air-feed hammer drill has a two-inch cylinder, weighs 70 pounds complete and consumes about 45 cubic feet of free air per minute at 80 pounds pressure. It is intended for raising and stoping, where all holes point upward. It is claimed that the Sullivan "D-21" can drill up-holes 25 to 50 per cent. faster than can reciprocating drills. They cannot, however, work well in wet and sticky ground, where the cuttings pack around the bit. Using a 1 3-4 or 2 inch starter, eight-foot holes, large enough for one-inch powder can be drilled.

Solid one-inch cruciform steel is employed. No shank is needed. The shank end is merely given a slight temper. This steel sharpens easily and allows the cuttings to run out freely.

All parts of the machine are light, strong, compact and accessible.

"D-15" and "D-19" are respectively light and heavy hand drills. The former weighs 18 pounds, uses 20 cubic feet of free air per minute and drills holes three feet deep, large enough for 7-8 inch powder. The latter

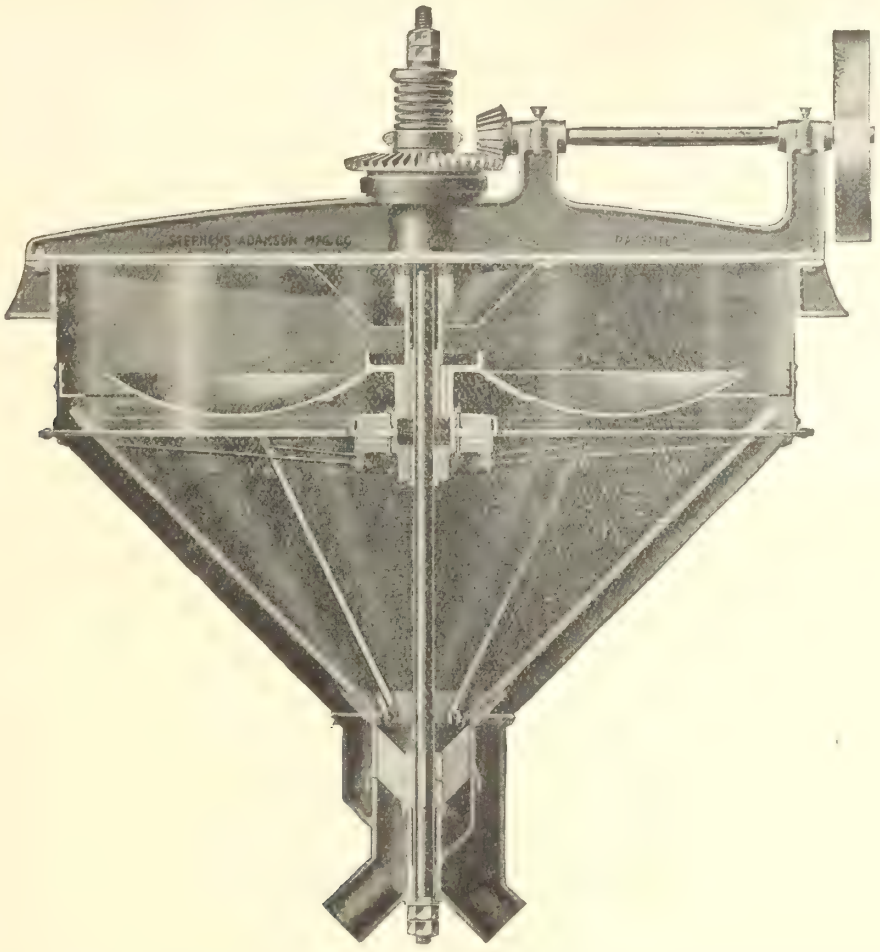


Sullivan "D-21" Air-Feed Hammer Drill—For drilling up-holes only for raising and back stoping.

weighs 30 pounds, consumes 35 cubic feet of free air per minute and will drill to five feet by using hollow steel and employing an exhaust for cleaning the holes.

"D-15" is widely used for block-holing, cutting hitches, and trimming. "D-19" is most useful for shaft sinking under favorable conditions.

The "Vibracone" Separator, manufactured by the Stephens-Adamson Manufacturing Company of Aurora, Ill., is described in their monthly publication, "Conveying and Transmission. The "Vibracone" separator requires less than one-half horse-power and will screen any product that can be separated by a revolving or vibrating screen, either wet or dry, from 1-2 inch to 200



meshes per inch. In actual practice it has screened 10 tons of Portland cement clinker per hour, 99 per cent. of which would pass a 20-mesh screen, giving tailings not in excess of 10 per cent. The screen cloth is of heavy wire about twice the size of the product desired. In screening, for instance, material that will pass a 20-mesh screen, a 10-mesh No. 20 wire screen is used. This gives a long life to the screen. The "Vibracone" can be used for handling cement, lime, clay, ores, sand, fine coal, carbon, graphite, stone, salt, etc., etc.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The first half of February has been marked by two sad accidents in Cape Breton mines, namely, the Port Hood explosion and the cage incident at Sydney Mines.

The Port Hood disaster occurred about seven a.m. on February the 7th, and resulted in the instantaneous death of ten men, four of whom were Bulgarian loaders, unable to speak English. From the evidence given at the inquest there appears to have been a small accumulation of gas caused by defective bratticing, but there does not appear to have been such a quantity of gas as would account for an explosion of such violence, and many circumstances point to an explosion of powder in an explosive mixture of gas and air, aided by the coal dust present.

The use of open lights was permitted in the mine, and also the use of loose powder, two cans of which containing 12 pounds are said to be missing. The testimony of the witnesses and of the men's officials who inspected the mine after the explosion is that the underground workings were well kept and in good condition. No doubt this was the case, but it is to-day accepted as an axiom that no mine is so safe that open lights can be used without danger.

The manner in which old miners cling to the idea that their efficiency is lowered and their wage earning capacity is impaired by the use of safety lamps would be amusing were it not so fraught with dreadful danger to themselves and their comrades. Some mines may be termed non-gassy, but this is only a comparative term, and it is every day becoming more certain that gassy or not gassy, the more or less hypothetical influence on wages of the closed lamp as compared with the naked light is not to be weighed in the balance for one instant against the general safety of the mine. What is the extra cost of safety lamps or any fancied inconvenience which may result from their use when compared with one mine explosion or one mine fire in its financial aspect? Safety lamps are the best insurance premium in a mine. A seam of coal is a layer of inflammable material containing occluded gases in more or less volume; being underground, the means of escape are limited, and the means of ventilation are restricted by th confined area; the necessity of keeping up the roof gives rise to the presence of more inflammable material in the shape of timber, and the grinding of the coal in the haulage boxes and by the traffic of the mine creates a dust which can be detonated. These conditions vary in degree, but not in kind. A non-gassy mine may at any moment become a gassy one, and in underground

conditions nothing is so certain as danger: safety being, as we said before, merely a comparative term. Viewed solely as a preventive of fire, apart altogether from the danger of gas and dust explosions, safety lamps are advisable in a mine. The Port Hood disaster is one more case in point.

The presence of the four Bulgarians in this death roll leads to another consideration. In the hands of careful and experienced miners the naked light may have been permissible in some mines, but when it is found necessary to introduce unskilled men naked lights become a standing menace and disaster is only a question of time. We are not discussing the advisability of introducing foreign and unskilled labor into our mines. This has arisen because of necessity, and from no other cause. But their presence means additional care in supervision . To be frank, the juxtaposition of naked lights, loose powder, and laborers unable to speak English, is unhealthy to say the least, and so it proved.

The other accident caused the death of two of the most valued officials of the Nova Scotia Steel Company, namely, Underground Managers John Dorsay and Councillor Malcolm Stewart. The men were about to descend the No. 1 mine on the 13th of February when, by some error, the cage was sent up into the headframe, where the Walker safety catch acted and released the hoisting rope. By some means, however, not yet explained, the catches failed to hold and the cage went to the bottom, a drop of 700 feet. This is the first accident of its kind in the whole thirty-one years that No. 1 colliery has been working. The death of two officials of such importance and worth has caused universal mourning among the mining community at Sydney Mines. A sad feature is that Mr. Dorsay leaves ten children. No doubt an enquiry will be made into the failure of the safety hook, which at present seems to have been a pure accident. These safety hooks are called into operation oftener than may be supposed, and it is only very rarely that they fail to act.

Mr. J. W. Devison has resigned as manager of Dominion No. 1 colliery, which position he has occupied since 1905. Previous to that Mr. Devison was manager of International Mine (Dominion No. 8). His successor is Mr. James D. Maxwell, lately manager of Dominion No. 2 and 9. Mr. Absalom Beaton has been appointed manager of No. 2 colliery (Phalen Seam), and Mr. John J. McNeil manager of No. 9 colliery (Harbor Seam).

The Dominion Coal Company have lately been unfortunate with their stores. The Glace Bay store was gutted by fire on the 23rd January, and the Dominion No. 1 store was entirely destroyed by fire on the 4th instant. The total loss is somewhere about $50,000, fully covered by insurance.

It is now being realized by some who made railing accusations against "Company's stores" that they are not altogether an unmixed evil from the standpoint of the employee. One thing is certain, that they are a powerful weapon in the hands of the coal companies with which to protect their workpeople against the exactions of unscrupulous tradesmen and local combines, and that they tend to keep down the cost of living is undeniable. This is the secret root of the opposition to them, such opposition being engineered so as to appear as if it emanated from the workpeople. The only valid objection to the company's stores is that in the past they have been too lenient in the matter of credit and have laid themselves open to the accusation of encouraging thriftlessness. Under the present regime this is decidedly not so. The fact that throughout the present winter the stores of the Dominion Coal Company have sold butter at from 30 cents to 32 cents per pound against from 33 cents to 36 cents per pound charged by other merchants should tell its own tale. Men who think do not usually quarrel with their bread and butter. If the coal companies apply their vast organizations and purchasing powers to the cheapening of the cost of living for their workmen, where is the iniquity of company's stores? The day when the vicious practices that antedated and led up to the Truck Acts could be carried on has gone by, and such practices have never been in existence in Cape Breton since the advent of Dominion Coal, and probably never before.

Although it is February, and it is supposed that no intoxicating liquors are being sold in Cape Breton, if one may believe the inspectors, the problem of the "pay-day drunk" is still with us. A few actual figures may illustrate its effect on the operation of the mines. The average daily output of the Dominion Coal Company's mines from the 27th January to the 31st inclusvie was 13,200 tons. Saturday, the 1st February, was pay day, and the average daily output from the 1st to the 8th, inclusive, was 9,800 tons per day. From the 10th to the 15th, inclusive, the output was an average of 11,500 per day. The day before pay day, that is the 14th, the output was 12,300 tons. Saturday, pay day, produced 9,200 tons, and Monday, the 17th, produced only 9,000 tons. The difference between these figures is attributable to the effects of pay day and nothing else. A fair estimate is that 14,000 tons per month is lost in outputs by mey staying off after pay day. The curve of outputs when plotted resembles the Alps, being a steady rise for thirteen days after pay day to a maximum height the day before pay day. Then comes a fall, which takes another fortnight to overcome, and this kind of thing is a continuous performance. And the amusing part of it is that theoretically Cape Breton County is *dry*. If this be done in a *dry* county, what will be done in a wet? The Scott Act was sufficiently farcical, but the solemn assurances given us periodically by inspectors—all honorable gentlemen—that no liquor is being sold and that the *lid* is on, have a flavor of comic opera. There is a humorous side to the matter, but it does not appeal to the colliery manager. Unfortunately, outputs are dreadfully practical things, and it is no comfort to a manager to know that his town is theoretically dry, when actually in cold truth perhaps one-tenth of his men are recovering from a drunk. It is not everywhere in Canada that men can afford to loaf in this fashion. It is hard to sympathise with tales of low wages and demands for advances in wages from men who will lose time in this way.

The formation of the Conciliation Board to adjust the differences between the Dominion Coal Company and their men in the matter of wages is now complete. Dr. Arthur Kendall will represent the men, Mr. J. Dix Fraser will represent the company and the chairman, and the third member of the Board is Prof. Adam Shortt, of Kingston, Ont. It is not likely the Board will meet before the 24th.

Port Hood.

The following is a summary of the evidence of John Moffatt, Grand Secretary of the P. W. A., a competent authority on conditions of coal mines and mining:—

"We mutually examined the balance inside on the north side of No. 3 level. Found debris on the high level outside of the balance, two little walls about 150 feet, and on the other level a little more. The mine is in a very nice condition, it is a very nice little mine, in fact it is in a splendid condition, well timbered, roadways are kept well and clean. The roof generally seems to be a very good roof, and the timber used is large and well put up. The ventilation is very good, in fact ice was found along No. 3 level south, and in the cans. The air is well conducted, the doors and steppings are firmly placed in the cross cuts and ribs. I found the condition of the mine, without a doubt, much better than the other mines of the province. The airways are all well placed, and the air well split and divided up. The air was also so properly conducted."

ALBERTA.

Taber.

It is reported that Spokane men have bought 440 acres of coal land at Taber for the sum of $75,000. A company under the

name of the Stanton Coal Mining Company, with a capital stock of $125,000, has been organized to develop the property. It is stated that it is the intention of the company to put the product of the mine on the Spokane market.

Dissatisfaction still continues at the rate of wages paid in some of the small mines in the Woodpecker district, near Taber, and it is probably that a Board of Investigation under the Lemieux Act will be formed to settle the wages question.

EDMONTON.

The Morinville mines, owing to the lack of market cause by the mild weather, have closed down No. 1 and 2 shafts. Only No. 3 shaft will be operated to supply the Canadian Northern Railway. No. 3 shaft is sunk in the centre of the coal basin, and can therefore be more cheaply operated than the other two shafts, also as this was the last shaft to be sunk it is better equipped and can handle the coal to better advantage. The miners' union officials complain that the company is keeping on single men and turning off married men, but the real state of affairs is that the company is dispensing with the services of the men who are discontented with their wages and are agitating for advances. This is the inevitable result of slack trade; "the kickers" are the first to be laid off.

Two very important bills have been introduced in the Alberta Legislature this session. The one is an "eight hours bank-to-bank" bill for miners, and the other is a workman's Compensation Act. Hon. W. H. Cushing, Minister of Public Works, introduced the former, and Hon. C. W. Cross, the Attorney-General, introduced the latter.

Hon. Mr. Cushing gave a long and interesting speech on the eight hours bill on the introduction of that measure. He cited the various laws in European countries limiting the hours of labor underground.

Several acts regulating hours of employment had been passed in the States, but these had been declared unconstitutional owing to the constitution in the United States making interference between contracting parties impossible. Hon. Mr. Cushing showed from satistics how in England, where the hours of labor were longest, the number of accidents was largest, and where the hours of labor were shortest the number of accidents were fewest. In England when it was proposed first to reduce the hours of employment of boys underground the claim was advanced that the industry would be ruined, but instead the industry had prospered.

It was found that men working underground could do more or as much work in eight hours as they could do working ten hours per day.

The Act which it is proposed to bring into force on March 31st, 1909, is very comprehensive. Under its provisions a workman shall not be below ground for the purpose of his employment, or of going to or from his employment, for more than eight hours during any consecutive twenty-four hours.

The owner, agent or manager of every mine shall fix for each shift of workmen in the mine the times at which the lowering and raising of men from the mine is to be commenced, and completed in such manner that each workman shall have the opportunity of returning to the surface without contravention of the time set out in the Act.

A register is to be kept by the mine owner as to the times at which the men go into the mine and come up, and the workmen may appoint one of their number to see that the provisions of the Act are being complied with.

The making of any false entry incurs a penalty. There are certain exemptions as to furnacemen, pumpmen, horsekeepers and mine officials, men engaged in work in case of accident or in extensive repair work.

A repairing shift may also work an extra shift on a Saturday to prevent Sunday work.

The Act may also be suspended by Order in Council for a stated period in case of any emergency, such as a fuel famine, etc.

The Hon. C. W. Cross made a lengthy speech on the Compensation Act on the occasion of the bill being given its second reading in the Legislature.

This bill, "An Act with respect to Compensation to Workmen for Injuries Suffered in the Course of Their Employment," previously introduced by Hon. Mr. Cross, was explained by him at length. The bill has now been referred to committee of the whole, where in the usual mode of procedure it will be considered clause by clause, its details entered into and what amendments are desirable made.

The scale of compensation provided includes weekly payments during incapacity for injury not to exceed $10, as well as payments of a lump sum to defendants, on death of workman from injury, this sum not to exceed $1,500. Arbitration is arranged for fully, as are schemes of insurance or compensation upon which the employer and employed may agree. The bill is to a large extent similar to that in force in Great Britain, adapted, however, to the conditions in this province. Hon. Mr. Cross said, in moving the second reading of the bill: "The principle which underlies this Act is the same as that which underlies the various systems of workmen's insurance which have been in force in Europe for more than 15 years."

He went on to show how poor a chance a workman had to obtain compensation under the old Employers' Liability Acts.

Hon. Mr. Cross, proceeding, said: "The discussion evoked in the early eighties by the Employers' Liability Acts brought out the fact which had not hitherto been sufficiently recognized, that a large percentage of accidents were due either to chance or to occurrences practically beyond human control, or at least to causes the responsibility for which could not be located, and that under modern conditions the class of accidents that was due to the character of the industry itself was growing proportionately very much larger than the class of accidents which was due either to the employer or that of the employee.

"It was shown by statistics collected at that time that considerably over 50 per cent. of the accidents occuring in the various parts of Europe in industrial employments were traced to the character of the industry in which the workmen were engaged. That is to say, to the fact that it was more or less of a hazardous occupation, rather than to any specific cause, such as negligence in either the employer or employee.

"There did not seem to be any reason why the burden of accidents of this kind should not be made to constitute an item in the cost of production in the articles produced by such industry in the same way as any other item of cost in that production.

"The amount of compensation under this Act varies under different circumstances. In each individual case it has to be determined by the amount of the injured person's earnings.

"The amount of compensation payable in the case of a person's death from injury from accident differs according as to whether such person leaves:

"(1) No dependents.

"(2) Partial dependents.

"(3) Dependents wholly dependent.

"Where the deceased leaves no dependents then the compensation payable is limited to the reasonable expenses of medical attendance and burial, but in no case to exceed $100.

"Where he leaves persons partly dependent on him, the amount is fixed by agreement or by arbitration, according to the nature of the case.

"Where the deceased workman leaves dependents wholly dependent upon his earnings the amount of compensation payable

is a sum equal to his earnings in the employment of the same employer during the three years immediately preceding the injury from which he dies, or $1,000, whichever of these two sums is the larger. However, in no case is the amount to be more than $1,500.''

Mr. W. C. Simmons, the member for the mining district of Lethbridge, also spoke in favor of the bill and said that on the whole he felt that the bill was an admirable one, and would recommend itself to every fair-minded person in Alberta.

SASKATCHEWAN.

TAYLORTON.

John Galvin, vice-president of District 18, United Mine Workers of America, who is organizing the miners in the Souris coal field, has met with considerably opposition from the mine owners in that district. The union movement commenced with the workmen, who formed themselves into a local union and then made representation to District 18 of the U. M. W. of A. to be admitted to their organization.

The Taylor mines, the Manitoba and Saskatchewan Coal Company mines, and the Roche Percee Coal Mining Company mines are the chief coal-producing outfits in the district. At all three mines the men have been organized. Last week, as reported, strenuous objection was made by Senator Watson to the presence of Mr. Galvin, the organizer, on the property of the Manitoba and Saskatchewan Coal Company property, and now all men who have joined the union at the Taylor mine have been dismissed.

The bulk of the capital invested in the Souris coal field comes from Winnipeg, and a considerable quantity of the coal finds its way into the same city. The coal is also shipped as far north as Saskatoon, where it competes with Edmonton coal, and as far west as Moose Jaw, where it competes with Galt coal.

The coal is a lignite and, although not a high grade lignite, yet makes a good fuel for domestic use. It is also used as fuel at elevators and milling plants, and has been tried on locomotives, but without success in this latter case.

BRITISH COLUMBIA.

ROSSLAND DISTRICT.

The Centre Star Consolidated, Le Roi, Le Roi 2, Limited, and Evening Star mines are working and shipping steadily, the combined tonnage averaging about 5,600 tons of gold-copper ore per week.

Mr. W. A. Carlyle is now in the camp, and is interesting himself in Le Roi affairs. He is a man who has enjoyed a wide experience in copper mining, and no doubt his services will prove valuable to the Le Roi Company. At the Northport smelter but one of their battery of six furnaces is running at present, this furnace handling 200 tons of ore per day. Most of the ore smelted, of course, is shipped to the smelter from Le Roi mine, but they are also getting about 200 tons per week from the United Copper Company, of Chewelah, Wash, 50 to 100 tons from the First Thought, Orient, Wash., and 30 tons from the Queen, Salmo, B.C.

The Consolidated Company smelter at Trail is smelting about 5,500 tons per week. The receipts of lead ore for January were 3,682,594 pounds, more than half of which came from St. Eupene mine. The next largest shipper was the Vancouver, in Slocan, which is controlled by Le Roi 2.

BOUNDARY.

The Granby Company has been maintaining shipments since last writing with the exception of week ending February 12th, when owing to some extra work having to be done only 17,000 tons was sent to the smelter. The total shipments from the Granby's Phoenix mines for January were 74,203 tons. Figuring on the basis of 24 pounds copper per ton of ore, the Granby must have produced about 1,725,000 pounds of copper in January.

A few men were put to work in the Snowshoe mine early in the month and got out about 400 tons of ore, which was shipped to the Trail smelter. This was shipped to meet some special requirements at the smelter. When the Snowshoe is working full force the major portion of its output is sent to the smelter of the British Columbia Copper Company, and only about one-third is smelted at Trail. Snowshoe ore is valued as a flux at the Trail smelter, but it is situated 100 miles from the mine, whereas the British Columbia Copper smelter is only 16 miles distant. Nothing new has been divulged as to when the Snowshoe and British Columbia Copper properties will resume operations.

There is much talk in Greenwood anent a proposed 3-mile tunnel to be driven from some point near that city to Pheonix camp, tapping the ore bodies of the latter place at some 2,100 feet depth. The estimated cost of the project is $3,000,000, and the Greenwood City Council may bonus the proposition in the sum of $50,000. Messrs. Johnosn, Peacock and Armstrong, of the Crescent mines, in Skylark camp, are the promoters of the idea and think that they can get Chicago capital to finance the scheme. While this work would no doubt be a source of gratification to the owners of mineral claims which it would pierce, the writer is somewhat skeptical as to whether the thing would pay the promoters unless they can make a reasonable arrangement with the mining companies as to ore encountered, or unless they would be entitled to certain tunnel claim rights, such as enjoyed in parts of the United States, a point which the writer is unable to ascertain at this writing. One thing is clear, it would not pay the Granby and other Phoenix mining companies to ship their ore through such a tunnel.

Spokane people have acquired an interest in the Bertha Con. G. M. Company and intend to put a small plant on the property and work it. A recent shipment of 500 tons sent to the smelter gave returns of $55 per ton.

NELSON.

The Hall mines smelter and the Silver King mine here have passed into the hands of the debenture holders, and it is hoped that work will be actively prosecuted on the Silver King now and the mine and smelter made to pay. The Silver King mine paid well in the early part of its working days, but the ore was lost and the mine closed until lately when it is claimed the lode was again encountered. The smelter was built especially to treat Silver King ores and was never very successful as a custom plant for several reasons. The plant is a little out of date now, and will no doubt have to be remodeled before economical smelting can be done there.

The Vancouver group has leased the Wakefield mill from the Hewitt Company. The Hewitt Company expect to treat about 100 tons of ore per day in the near future and ship a couple of cars of concentrates to the Trail smelter.

Minneapolis capitalists have been looking over the Orebell and other Salmo properties. Salmo camp is busy just now. The Emerald recently shipped three cars of ore to Trail, the Nugget mine two cars, one of which assayed over $100 to the ton. Mining is quiet in the Lardeau. The Blue Bell mine is now employing about 100 men. The Argenta and La Plata mines still remain closed down.

EAST KOOTENAY.

The St. Eugene mine is working steadily, and is shipping 325 tons of ore per week to Trail, in addition to the quantity concentrated. A body of ore 40 feet wide and 300 feet in length has just been opened up on what is known as the ''2,000 foot

level'' of the mine. Mr. S. G. Blaylock, formerly of the Hall mines smelter, has succeeded the former superintendent, Mr. W. P. White.

At a recent meeting of the Sullivan Group Manufacturing Company, Mr. James Finley, formerly in charge of the mines, was appointed manager of the mines and smelter, and the head office was removed to Marysville from Spokane. It is certainly the best policy for the offices of a mining company to be right at the mines, as it is much more convenient for all concerned and certainly more economical.

CROW'S NEST.

Coal mining is quiet along the Crow's Nest Pass line, but the Crow's Nest Pass Coal Company and the International Coal Company are working regularly. The former company will make extensive improvements to their plant in the near future, with a view to augmenting their output. These additions will entail an expenditure of nearly one million dollars.

Work is proceeding at a good rate at the Hosmer mines of the Canadian Pacific Railway Company, where 200 coke ovens and a large tipple are being constructed. At the expiration of the coke contract between the Trail smelter and the Crow's Nest Pass Coal Company the Canadian Pacific Railway Company will supply that plant and all of its mines and western lines with its own products. As the output of its mines will be greater than its own consumption, the railway company will be in the market as a vendor.

The proposed legislation whereby the coal miners will be constrained to pay a tax of ten cents per ton on coal mined and of fifteen cents per ton on coke manufactured, instead of five cents on coal and nine cents on coke as heretofore, is causing considerable comment among the coal mining men. While it is only right that the province should derive some revenue from its rich coal and mineral lands, still, legislation in this direction should be tackled with due care and the already heavily taxed mining industry should not be made to bear a burden that will prove a detriment to its progress. The competition of Alberta coal mines and the view that prospective investors will take of it, together with the possibility of adding more to the two per cent. load now carried by the metal mines, through the coking and smelting industries, must all be carefully considered. However, there is little doubt but when the whole thing is threshed out legislation will be enacted that will benefit all concerned and the taxation will be placed on a more uniform basis than it was before.

We cannot be too emphatic in our exhortations to small investors in regard to buying stock in mining propositions that they know nothing about. The days of the ''wild-cat'' are not past by any means, and like the humble pussy of the domesticated variety, by means of its nine lives, is still with us. Just because the promoters secure a glowing write-up in some of the daily papers and show assay certificates running into high figures, does not say that the mine is a proposition that can be worked on an economical and businesslike basis. There are good mining companies who seek capital in this way, but those with merit are few and far between, and concerns who inform the possible investor that ''next month the stock will advance five cents per share'' and use like catch phrases are to be shunned. In fact, if one has not seen the property or had a report on it from some banker or commercial agency it would be better for them to keep their savings where they know they are safe and are earning the usual three or five per cent.

GENERAL MINING NEWS

NOVA SCOTIA.

GLACE BAY.—A circular issued by the Dominion Coal Company announces that J. W. Devison, manager of Dominion No. 1 colliery, has resigned. James Maxwell, manager of No. 2 colliery, succeeds him. Collieries Nos. 2 and 9 will hereafter be managed by two men instead of one.

Deputy Minister Mackenzie King arrived here last week. Mr. J. Dix Fraser is the representative of the company, and Or. Arthur Kendall, M.P.P., for Cape Breton, the men's representative.

The Dominion Coal Company have commenced sinking an air shaft at their new Dominion No. 12 colliery, and have quite a large force of men at work there. Superintendent of Mines Fergie said the company were well satisfied with the progress made at the new Victoria colliery during the past few months. He said the sinking of the new shaft was being carried forward with splendid results, and it was down to a depth of 535 feet. They were hoisting an average of 100 tons of coal daily at the new colliery. The company have had only about sixty men employed at No. 12 up to the present time.

The new long wall mining machine is in operation on the Phalen seam. It is a disc diamond coal cutter. The picks are attached to the sprocket itself and the chain is done away with.

HALIFAX.—Dr. A. S. Kendall, senior M.P.P. for Cape Breton, has given notice of a motion for the appointment of a commission to inquire into all the conditions of coal mining in Nova Scotia. The commission, if granted, will be instructed to ascertain, and make public, the present truth as to the following

1. The extent and conditions of the Province's asset in coal.
2. The conditions of coal mining leases.
3. The methods employed by promoters to form companies and to obtain capital.
4. The preparation of plans for new mining enterprises and extensions.
5. The methods of mining and losses of coal to the Province incident to mining.
6. The prices of coal in this Province and beyond the Province.
7. The remuneration of miners, provisions for old age, for injuries and dependents of miners.
8. The enforcement of laws intended to lessen or prevent accidents.
9. Further requirements to prevent accidents and to afford relief to victims or the dependents of victims.
10. And other matters relating to mining.

NEW BRUNSWICK.

ST. JOHN.—F. J. Jones, manager of the Dominion Iron & Steel Company, of Sydney, C.B., which has completed the negotiations and taken over the iron mines of the New Brunswick Iron Company, at Lopreaux, was in the city to-day, and said that men have already started at work drilling to locate the body of ore. Asked if it was probable that a smelter would be built on the new property, he said that was a matter for the future to decide.

ONTARIO.

COBALT.—During 1907 a complete plant was installed at the Nancy Helen. The strike delayed mining operations; but now the No. 1 shaft is down 125 feet. Two drifts at the 100 foot level, on two diverging veins, are in 40 and 44 feet respectively. The shaft will be sunk to 200 feet and levels started at 50 foot, 100 foot, 150 foot and 200 foot. Crosscutting will be continued at the 100 foot level to catch the Buffalo veins. Five cars of ore are on hand. A concentrator will probably be erected.

A strike was made recently at the Badger mine, in No. 6 shaft, on what is known as No. 9 vein. This shaft was sunk in calcite, where only cobalt was shown on the surface, but at a depth of 72 feet the vein is from four to eight inches in width, and shows plenty of native silver, argentite and niccolite.

During January the Nipissing Company shipped six cars of ore of 180 tons, containing silver estimated at $322,900 ounces, and valued at $166,000. This makes the second largest shipment in one month since January, 1907. In September, 1907, shipments amounted to 323,000 ounces, which marks the record for that year.

Shipments for the week ending February 22nd were smaller than usual. The City of Cobalt with 42,960 pounds, the O'Brien with 129,860 pounds, the Temiskaming with 56,250 pounds, and the T. & M. B. with 125,000 pounds, totalling 355,070 pounds, or 177 tons, made up the week's record.

Up to the middle of October last nearly five hundred companies had been incorporated for the purpose of carrying out mining operations in the Cobalt and Larder Lake districts. Four hundred and ninety-one companies received charters, and of these the great majority proposed to operate in the Cobalt district. The total capitalization of these companies totals $472,326,000. The total paid-up capital amounts to about $79,273,838. The total capitalization has been further increased by many added millions. A further analysis of the figures shows that of the 491 companies previously referred to no less than 240 were incorporated with their proposed capital set out as being a million dollars or over. In eighty-nine cases the capital was between $500,000 and $1,000,000; 104 between $100,000 and $500,000, and 60 under $100,000.

OTTAWA.—Mr. John Retallack and Mr. Louis Pratt, of Kaslo, B.C., representing the Boards of Trade and owners of lead mines in British Columbia, presented petitions to the Government on the 20th of February, asking for a renewal of the bounty on lead for another period of five years. The conditions asked for are different in many respects from those now in force. In 1903 the Government appropriated $2,500,000 to be paid in lead bounties between them and June 30th, 1908. The bounty was to begin automatically whenever the English price of lead fell to £12 10s. per long ton, and was to be paid at the rate of 75 cents per 100 pounds, or $15 per short ton, until the price of the British Columbia product reached £16, when the bounty would stop. This stimulate dand developed the British Columbia lead industry. But owing to the fact that the price of lead in England rose above the minimum £12 10s. soon after the bounty was inaugurated, and is now about £14, the bounty was partly inoperative. Consequently, by next June, when the arrangement expires, only $750,000 of the original $2,500,000 appropriated, will have been expended. The lead miners are therefore asking for a new appropriation of $2,500,000, and are requesting the the bounty begin when the English price is £14 10s. and cease at £18. Even this will afford but moderate protection to British Columbia. Lead produced in that province is shut out of the United States by a duty of $42 per ton, but receives very little protection in the Canadian market. The smelting charges in British Columbia are low. But the cost of marketing is heavy. The industry will be put on a firm footing and the market facilities wil lbe improved by Government assistance at this conjuncture.

ALBERTA.

CALGARY.—On February 12th a joint committee of mine operators and workers met in Calgary. The object of the meeting is the settlement of disputes. Mr. L. Stockett, of the Bankhead mines, is chairman. The union, the miners, and the operators are represented. The meetings are being held in camera.

BRITISH COLUMBIA.

FERNIE.—The pay roll of the three collieries of Coal Creek, Michel and Carbonado amounts to $185,236.25.

HOSMER.—The Hosmer Mines Company have expended to date $1,500,000. Shipments of coal will begin in 1908 and will be increased as the market requirements justify to 3,000 tons a day. The first installation of coke ovens will have capacity of 300 tons a day.

VANCOUVER.—The first shipment of coal from the collieries of the Diamond Vale Iron & Coal Company, in the Nicola country, has reached Vancouver.

ROSSLAND.—The main ledge of the Stemwinder mine was struck at the 500 foot level last week. It is 80 feet from the station, and men are now working their way through the ledge.

The Vancouver mine near Silverton is shipping zinc ore to Antwerp. Two more compressors are to be put in at this mine.

NELSON.—The Kootenay Engineering Works are installing their portion of the machinery for the Canada Zinc Company. The roaster has been rivetted and the whole plant will shortly be in readiness.

At a meeting of the Nelson Board of Trade it was resolved to telegraph the local member of the Provincial House, Mr. G. A. B. Hall, asking him if possible to obtain delay in the passage of the coal tax bill. The telegram was sent in response to representations made by the Fernie Board of Trade.

The Hall Creek Placers, ten miles south of Nelson, are to be worked this spring. All the claims will be consolidated under a large company. On one of the leases an hydraulic plant will be supplemented by a set of Wilfley concentrating tables.

NELSON.—The Hewitt Mining Company will commence milling ore within two months. The mill is awaiting the construction of a subsidiary tramway. Much of the material of construction has been manufactured in Nelson.

VANCOUVER.—The sending of a lot of Australian and New Zealand miners to the Marble Bay mines may give rise to trouble with the labor organizations.

NELSON.—Arrangements for the consolidation of the Krao with adjoining properties are almost completed. The Krao Company was floated last year on a $600,000 capital. The mine is at Ainsworth on Kootenay Lake.

The Consolidated Mining & Smelting Company has announced that owing to improved market conditions a reduction will be made in the smelter tariff for lead ores. The Trail smelter has been accumulating lead ore steadily, whilst the American smelters have refused it throughout the stringency.

BARKERVILLE. The Canadian Creek shaft was unwatered on January 2nd. It bottoms in two feet of clay. The Willow River Mining Company began breasting pay gravel during the latter part of January.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Extensive alterations are being carried out at the Vale coal pit, Birtley Black Fell, England. A new winding engine has taken the place of one that has done service for 120 years, and the output will be increased from 480 to 900 tons per day.

The Newport Chamber of Commerce have unanimously expressed their condemnation of the mines eight hours bill. Newport is the third largest coal-exporting port in Great Britain, and it is asserted that the adoption of the measure would reduce the export by 750,000 tons per annum.

GERMANY.

The Eich Huttenverein, Le Gallais-Metz & Company, of Luxemburg, have decided to erect a larger electric steel works, with plant on the improved Kjelin induction furnace system. Experiments carried on for eight months with a view of producing special qualities of steel and steel castings have yielded favorable results. The output will be 250 tons per day.

The Hansa Coal & Coke Company, Bremerhaven, which has hitherto drawn its supplies from England, has contracted with the Rhenish-Westphalian Syndicate for 2,000,000 tons of coal.

The Prussian Government has introduced a measure authorizing the development of the coal properties in the Dortmund district, acquired by the State in 1902, by means of three new shafts and to raise 55,000,000 marks for the purpose.

AUSTRO-HUNGARY.

An investigation of the Rivers Drau, Mur and Danube, which have furnished much alluvial gold in Hungary, has led to the conclusion that in the Tyrol, Salzburg and Styria there must be numerous unworked gold veins.

AUSTRALASIA.

Gold dredging in the Bright district, Victoria, is yielding well, and it is expected that the value of the output for 1907 will run over £125,000.

Additions to the milling plant of the Waihi Gold Mining Company at Waikino, New Zealand, have been made on an extensive scale. When completed in March the treating capacity of all the company's mills will be about 30,000 tons per month, and the bullion output will reach £70,000. The power will be supplied by gas-producing engines of 1,000 horse-power capacity.

SOUTH AFRICA.

In accordance with an agreement with the De Beers Company, the Premier Company is about to shut down a tube mill and magnetite separator and part of the washing gear, which it is estimated will result in a reduction of the diamond output of 30,000 carats per month.

A cablegram from Pietermaritzburg, Natal, states that an explosion in a coal mine at Glencoe, on February 14th, buried five Europeans and forty natives. A rescue party of five Europeans and twenty five natives, headed by Government inspectors, went down, when another explosion occurred, burying them. All but eight natives were at last accounts supposed to have perished.

A dredger belonging to an English syndicate is operating on the Queen's River, Transvaal, just below its junction with the North Kaap river. It has a capacity of 1,500 tons per twenty-four hours.

JAPAN.

A combine of 32 owners of collieries in Fukuoka, Oita and Kumamoto prefectures has been effected, and a company organized under the title of the Dai Nippon Taeko Kaisha (Japan Colliery Company). They are endeavoring to secure a foreign loan for the improvement and extension of the mines.

The results of official investigation on the Japanese portion of the island of Sakhalien show that it presents a favorable field for mining enterprises. Concessions for the working of two coal mines have been granted.

INDIA.

The production of coal in British India has continuously increased since 1886. In 1878 it was 1,015,210 and in 1906 had risen to 9,783,250 tons. Ceylon and the Straits Settlements are the principal export markets.

TUNIS.

Mining made considerable progress in 1906 as compared with the previous year. The phosphate exports increased to the value of 18,000,000 francs as compared with 12,000,000, and the output of copper, zinc and lead ores also showed an increase.

UNITED STATES.

From the Deer Trail district in Eastern Washington tungsten ore is to be shipped to the Krupp people, Essen, Germany. About two tons per day is the output.

The rush to the new Nevada gold camp at Rawhide is said to be the greatest in the history of Pacific coast mining. Thousands from California and the East have been attracted since the middle of January. Other camps are being deserted and there were at last accounts some 3,500 people in the camp. The ore is claimed to yield very high values. It is quartz and porphyry, and most of the rich finds have been on the surface. The rock is somewhat porous and will prove a free-milling medium, running up well in gold percentages with very little silver.

Mr. Joseph A. Holmes, chief of the technological branch of the United States Geological Survey, has been delegated by the Government to make experiments, probably at Pittsburg, to devise some better means of protecting miners from gas and coal dust explosions in coal mines.

The output of ore from the Cripple Creek district for January was the largest on record since the labor troubles of 1904, amounting to 56,785 tons of a gross bullion value of $1,445,820, being nearly a quarter of a million in value in excess of the production of January, 1907.

MEXICO.

Since the first of the year about 400 men have been added to the working forces of the companies operating at Cananea, most of them being employed by the Greene-Cananea Company.

The Los Obates Mining Company, in which British capital is largely invested, has taken over the silver mine of J. Solis in the Obates mining district, Chihuahua, which has produced over $1,000,000. A concentrator will be added to the plant, which already includes a 10 stamp mill.

COMPANY REPORTS.

The first annual report of the Cobalt Lake Mining Company has come to hand. Pressure upon our space has made it impossible to give this important document editorial notice. In our next issue, however, such notice will be given. Meanwhile THE CANADIAN MINING JOURNAL'S congratulations are tendered to the working executive of that company. Pitfalls have been evaded and progress has been made. The managing director, Mr. D. B. Rochester, and the engineer, Mr. E. L. Fraleck, have won and maintained the confidence of the shareholders. This they have done in the face of some large and many petty discouragements.

Before discussing the body of the report it may be said that the JOURNAL has no sympathy with a certain class of obstructionists who are attempting, by means of legal technicalities, to block the progress of the Cobalt Lake Mining Company. If the claims of these men have even the color of genuineness they should have been settled or compromised long ago. If they have no just cause of complaint, they should be arbitrarily and forcefully quieted. The questions involved, also, could be settled by arbitration.

Under date of December 31st, 1907, the engineer, Mr. Fraleck, reports as follows:—

The work done on the company's property up to date consists of 1,393 feet, made up of 160 feet of raising, 567 feet of sinking and 666 feet of drifting.

"The north shaft has been sunk to a depth of 70 feet and a station cut at the 60 foot level. It is the intention to continue this shaft a further depth of 60 feet and prospect he north end of the lake by means of drifts at the 120 foot level.

"No. 4 shaft is 154 feet in depth with the first level at 86 feet. Three hundred and twelve feet of drilling and crosscutting has been done, comprising 60 feet of drifting on the No. 4 vein, 86 feet of drifting on the No. 3 vein, and 166 feet of crosscutting. It is the intention at the 154 foot level to drift across the lake on the strike of the No. 4 vein and crosscut to the No. 3 vein, which may then be opened up by a drift and rendered available for stoping in a manner similar to that on the first level.

"No. 6 shaft has attained a depth of 90 feet, with a station at the 70 foot level and a drift to the east on the vein 23 feet. It is the intention to sink this shaft an additional 40 feet and crosscut to the south end of the lake at the 120 foot level.

"These shafts will comprise our main working shafts, and to them the work at No. 1, No. 2, No. 3 and No. 5 will be subsidiary, for example (the company's No. 5 shaft is 100 feet in depth with a station at the 93 foot level) 42 feet of drifting has been done on the No. 5 vein, a crosscut run to the south a distance of 68 feet and to the north 139 feet. An additional 50 feet to the north will connect the No. 5 workings with those of No. 4, which can then handle the work of the No. 5 shaft and eliminate the expense of its maintenance.

"All of these shafts have been substantially timbered."

Mr. Fraleck's report is followed by that of the managing director, Mr. D. B. Rochester, who writes under date of January 17th:—

"Plant and Equipment.—The statement of present value, which stands at $37,365, consists of two 100 horse-power boilers, 13 drills cross compound air compressor with condenser, electric light plant, 3 air receivers, and a pipe line which covers our boundary from the north end of the lake to the McKinley-Darragh line, a distance of seven-eighths of a mile, with four hoists, pumps, drills and everything required for a first-class plant, hoist houses, ore houses, two blacksmith shopes, shaft houses, storehouses, water tank for fire protection, and all the accommodation necessary for housing and boarding 75 men.

"Development.—The entire development charges, amounting to $40,000, is more than covered by ore at present bagged and in the ore house, and nearly completes the most expensive part of our development, that is, the sinking of the shafts.

"Ore on Hand.—The amount of ore actually bagged and ready for shipment amounts to 52,000 pounds first grade silver ore, 30,000 pounds second grade silver ore, and 90,000 pounds of smaltite, niccolite and cobalt ore. This I will not attempt to estimate the value of, but feel satisfied that we have enough to cover all we have spent in development work.

"Conditions at Present.—It would be unfair to attempt to give an estimate of the value of the ore in sight, as it would be altogether speculative and not at all reliable. We have seven veins that we have done more or less sinking on, three of these are smaltite and niccolite veins that run from two to six inches in width, one niccolite vein, that we have drifted to at the 86 foot level and at that depth is from 26 to 28 inches in width, and has lessened in niccolite and increased in cobalt. This we are drifting to at the 154 foot level and hope at that depth to get good silver values. The other three are silver, cobalt and smaltite, and it is from these that we have taken nearly all our silver ore. We have at 80 feet struck a slate formation which continues for a depth of about 12 feet and changes again to conglomerate. In one instance we have lost our vein in this formation and, although we have gone below this for a considerable depth without recovering it, still, it may be either to the north or south of our shaft. The other veins we will drift to at the first level.

"Owing to the great activity in the camp in the summer of 1907 and the demand for the better or skilled class of labor, the work was more expensive than usual. The strike by the Western Federation of Miners on the 8th of July increased the difficulty and made it impossible to properly man the property for at least six weeks or two months.

"The Future.—Our aim is to get our shafts at the north and south end of the lake down as quickly as possible, so that we can drift under the lake at both ends and also at our No. 4 shaft, where we are now 154 feet in depth. We have at the south end the three veins of the McKinley-Darragh, and at the north end the prospect of the Right of Way vein. We have a first class plant in every particular, and has worked since its installation without a hitch, and to our engineer, Mr. Fraleck, is due the credit for its success. We have demonstrated beyond a doubt that Cobalt Lake can be mined from beneath with perfect safety. Our expense in the way of equipment will be small in the future as it will take the shape of expense maintenance and will be a charge against development instead of equipment as formerly. I have about completed arrangements for shipping a car of first grade ore to Copper Cliff, and expect to do so in a few days.

"We are having a survey of the property made, and a plan showing buildings and shafts, which will be submitted to you with this report."

The fact is mentioned that on the 25th of January, 1908, the first shipment of ore was made. This consisted of 53,878 pounds of first grade silver ore.

The report is accompanied by a not to artistic cut of the plan of the company's holdings.

The financial statement is given, thus:—

FINANCIAL STATEMENT FOR YEAR ENDING 31st DECEMBER, 1907.

BALANCE SHEET.

ASSETS.

Cash in Bank	$ 79,534.35	
Mine Plant and Equipment, inculding Buildings, Equipment, Power Plant, Office Furniture, etc., etc.,	39,340.02	
Suplies	1,658.09	
Insurance, unexpired	188.00	
Development Charges $39,940.00		
Ore extraction Charges 912.04		
	40,852.04	
Mine Property	3,635,000.00	
Profit and Loss	132,776.20	
		$3,929,348.70

LIABILITIES.

Capital Stock	$5,000,000.00	
Less Treasury Stock still to issue	1,070,834.00	
		$3,929,166.00
Accounts Payable		182.70
		$3,929,348.70

PROFIT AND LOSS.

EXPENSES. Including Preliminary, Prospecting, Legal, Camp and Head Office Expenses and Salaries	$ 27,431.48	
Depreciation on Equipment, etc.,	3,862.16	
Discount on Treasury Stock sold	106,124.90	
		$ 137,418.54
LESS.		
Interest on Bank balance	$ 3,603.09	
Transfer Fees Account	$ 1,039.25	
		$ 4,642.34
		$ 132,776.20

The annual meeting of the company, held in Toronto on February 21st, when this report was submitted, was pleasingly quiet. The next annual meeting is to be held in Ottawa. The old board of directors was re-elected with the addition of Mr. E. Marchand, as the representation of Eastern shareholders. Sir H. M. Pellatt was elected president and Mr. G. F. Henderson, vice-president.

RIGHT OF WAY MINING COMPANY, LIMITED.

At the annual meeting of the Right of Way Mining Company, it was announced that during the calendar year, ending December 31st, 1907, $70,000 had been paid out in dividends. In all, about $340,000 worth of ore had been taken out of the mine. This includes the $163,000 awarded to Right of Way in its dispute with La Rose mine. As the Right of Way mine cost only $50,000, its dividends are, at least, substantial. During 1907 the company sold ore to the value of $179,621.75. Net profits were $101,522.35. Two 7 per cent. dividends were paid, totalling $69,889.75. The profit and loss account shows a balance of $31,632.57. On plant and equipment $40,000 has been spent. The 25 per cent. royalty, payable to the Ontario Government, has amounted to $43,000.

The old Board of Directors were re-elected as follows: President, Mr. Geo. Goodwin; Vice-President, Mr. T. A. Beament; directors, Messrs. Edward Seybold, A. W. Fraser, and Dr. J. F. Kidd; Secretary-Treasurer, Mr. E. A. Larmonth.

NOVA SCOTIA STEEL & COAL COMPANY.

The annual meeting of the directors of the Nova Scotia Steel & Coal Company was held at the Windsor Hotel, Montreal, on Tuesday, February 17th. President R. E. Harris occupied the chair. After fully discussion of the profit and loss account, the statement of assets and liabilities and the general manager's report, the usual quarterly dividends of 2 per cent. on the preferred and 1 1-2 per cent. on the common stock were declared. These are payable April 15th, to shareholders of record, on March 31st next.

Although the New Glasgow works were closed for several weeks at the end of the year, yet the business of the company was the largest in its history. There was a considerable increase in the output of iron and steel, but a decrease in ore and coal. The steel shipments aggregated 53,632 tons, about 25 per cent. over the preceding year. A comparatively small amount of pig iron was sold, almost the whole output being converted into steel.

In May it was decided to single shift No. 3, colling, hence the quantity of coal mined was smaller than usual.

The profits for 1907 were $944,790.66, as compared with $960,281.03 for the preceding year.

The amount at the credit of profit and loss account on January 1st, 1907, was $1,180,783, which, with the profits of the year, makes a total of $2,125,574.55 to the credit of this account, on December 31st, 1907. Out of this the sum of $158,904.50 has been transferred to the credit of the special reserve funds, of which $50,000 is for general depreciation and renewals, $14,404.50 for blast furnace renewals (being 25 cents per ton on the output of pig iron during the year), and $14,500 for depreciation of the shipping property owned by the company, $5,000 has been set aside for a contingent liability in connection with accidents, and the sum of $75,000 has been placed to the credit of a special account for ore exploration and development. During the year these reserve funds were charged with the sum of $17,656.79 for new furnace lining, bosh plates, crucible jacket, etc., which are at present in stock, and will be used when the blast furnace is next re-lined.

The balance to the credit of these special reserve accounts is now $792,237.22, as compared with $650,989.51 at the beginning of the year.

The balance carried forward to the credit of profit and loss on the 1st of January, 1908, is $1,202,604.39, as compared with $1,180,783.89, on the first of January, 1907.

Sum expended.—The sum of $378,386.37 has been expended during the year on capital account, in equipping the new colliery at Sydney Mines, new forge buildings, at New Glasgow, the purchase of iron ore properities, the development of the submarine iron ore areas at Wabana, and for plant, improvements, etc.

During the year four quarterly dividends of 1 1-2 per cent. each on the common stock, and the usual quarterly dividends of 2 per cent. each on the preferred stock of the company, have been paid.

The annual report of the Dominion Coal Company to be submitted at the meeting early in March, is now being completed, and will show that the total output for 1907 showed a decrease of 75,000, as compared with that of 1906, which amounted to

3,552,746 tons. The money received from the Dominion Iron & Steel Company on the existing two years' contract is being placed in a contingent fund in case the old contract is maintained by the Privy Council, and the money will have to be paid back.

The Dominion Steel Company has issued the following statement:—

The supplementary annual report issued on 20th September last, contains a statement of the claim against the Coal Company, as itstood at the close of the previous month. The position of the claims, as at 31st December, 1907, exclusive of interest, is as follows:—

Paid for extra cost of coal purchased from Dominion Coal Company	$1,237,235.39
Paid for extra cost of coal purchased from others	402,721.43
Damage due for short deliveries in August, September and October, 1906.	132,252.75
Damages due to cessation of deliveries in November, 1906, estimated..	479,000.00
Total, as on 31st December, 1907, exclusive of interest	$2,251,209.57

Your directors have to report that the Coal Company has obtained leave to appeal from the judgment of the Supreme Court of Nova Scotia to the Judicial Committe of the Privy Council, in England.

Temiskaming directors have declared their first 3 per cent. divident. It is payable March 12th. The old boards of both companies were re-elected. The Temiskaming board is composed of: President, Louis Struber; Vice-President, Robert T. Shellington; and directors, Harvey D. Graham, Alex. Fasken, and Harvey D. Roberts, Mr. Graham is treasurer and Mr. Fasken secretary.

The annual meeting of the Cumberland Railway & Coal Company has been prostponed indefinitely. Mr. J. R. Cowans, the general manager, was in Montreal recently, but has returned to Springhill.

The annual meeting of the Dominion Coal Company will be held in Montreal on March 6th. Books close on February 21st to March 6th.

STATISTICS AND RETURNS.

CROW'S NEST PASS COAL SHIPMENTS.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending February 14th, was 21,651 tons, or a daily average of 3,608 tons. In the same week last year the output was 20,219 tons, or a daily average of 3,370 tons. The output for the week ending February 16th, 1906, was 16,773 tons, or a daily average of 2,795 tons.

The output of the Crow's Nest Pass Coal Company for the third week in February, during the past four years, compares as follows:—

	Tons.	Daily aver.
1908	21,205	3,534
1907	21,488	3,581
1906	17,981	2,997
1905	18,457	3,076

Following are the shipments from Cobalt camp for the week ending February 15th:—

	Ore in lbs
Buffalo	63,750
Coniagas	65,440
Drummond	40,000
Kerr Lake	42,610
La Rose	59,390
McKinlley-Darragh	386,420
Nipissing	64,200
O'Brien	130,750
Tem. and H. B.	66,000
Trethewey	115,080
Watts	61,700

The total shipments for the week were 767,640 pounds, or 483 tons. The total shipments from Januarylst to date, are 4,159,232 pounds, or 2,079 tons. The total shipments for the year 1907, were 28,081,010 pounds, or 14,040 tons.

COBALT ORE SHIPMENTS.

Following are the shipments of orre from the Cobalt camp for the week ending February 8th:—

	Pounds
Drummond	52,340
King Edward	62,370
La Rose	42,452
O'Brien	191,000
Temiskaming	66,000
Watts	61,700

The total shipments for the week were 539,842 pounds, or 269 tons. The total shipments from January 1st, are 3,191,592 pounds, or 1,595 tons.

The London Statist calculates the world's output of gold in 1907, as £82,205,000, or $411,025,000, against £82,482,00 in 1906, or $412,410,000, divided as follows:—

	1907.	1906
Transvaal	£27,406,000	£24,585,000
Rhodesia	2,218,000	2,000,000
West Africa	1,160,000	877,000
Australia	15,539,000	16,929,000
India	2,559,000	2,261,000
Canada	2,000,000	2,300,000
United States	17,923,000	18,875,000
Other countries	13,400,000	14,300,000
Total	£82,205,000	£82,482,000

World's production in 1905, was £75,427,000; 1904, £69,378,000; 1903, £65,192,00; 1902, £59,348,000; 1901, £52,198,000; 1900, £50,915,000; 1895, £39,752,00; 1890, £24,260,000; 1885, £22,750,000; 1870, £21,370,000.

Following are the weekly shipments from Cobalt camp, and those from January 1st, to date.

	Week end Feb. 22. Ore in lbs	Since Jan. 1. Ore in lbs
Buffalo	.....	237,500
Coniagas	.....	198,930
Cobalt Lake	.....	50,800
City Cobalt	42,960	42,960
Drummond	.....	92,340
Foster	.....	168,600
Kerr Lake	.....	82,590
King Edward	.....	127,240
La Rose	.....	237,842
McKinley	.....	506,420
Nipissing	.....	437,700
Nova Scotia	.....	40,790
O'Brien	129,860	828,240
Standard	.....	29,730
Silver Queen	.....	243,000
Silver Cliff	.....	52,000
Silver Leaf	.....	62,000
Townsite	.....	45,000
Temiskaming	56,250	115,650
Temiskaming & H. B.	126,000	258,000
Trethewey	.....	115,000
Watts	.....	61,700

The total shipments for the week were 355,070 pounds, or 177 tons. The total shipments from January 1st, to date, are 4,514,302 pounds, or 2,257 tons. The total shipments for the year 1907, were 28,081,010 pounds, or 14,040 tons. In 1894 the camp produced 158 tons, valued at $136,217; in 1905, 2,144 tons, valued at $1,473,196; in 1906, 5,129 tons, valued at $3,900,000. The estimated value of the ore shipments for 1907, is between $10,000,000 and $12,000,000.

Following are the coal shipments of the Nova Scotia Steel & Coal Company, for January:—

January, 1908	47,750
January, 1907	38,729
Increase, 1908	8,021

The following are the lead receipts at the Consolidated Mining & Smelting Company's plant, at Trail, for the month of January last. The figures given are in pounds:—

Arlington, Erie	13,219
Arlington, Slocan	[illegible]
Bluebird, Sandon	[illegible]
Bluebird, Rossland	2,742
Canadian Group	11,817
Emerald	68,429
Ferguson	92,954
Hewit	[illegible]
Keystone	[illegible]
Kootney Ore Co	2,232
Krao	[illegible]
Lone Bachelor	19,938
La Plata	153,013
Montezuma	29,184
New Jerusalem	[illegible]
Lightning Peak	12,199
North Star	[illegible]
Richmond-Eureka	47,516
Reco	[illegible]
Ruth	154,190
Revenue	19,582
Rambler-Cariboo	108,661
St. Eugene	1,896,677
Standard	198,003
Silver Cup	3,481
Sunshine	9,580
Sunset	85,021
Slocan Soverign	15,939
Summit	502
Vancouver	305,687
Whitewater Deep	134,008
Whitewater	20,936
Nugget	263

BRITISH COLUMBIA ORE SHIPMENTS.

Week ending February 8th:—

	Week.	Year.
Boundary shipments	17,034	86,366
Rossland shipments	5,382	33,775
Slocan-Kootenay shipments	2,089	16,426

The total shipments for the past week, were 24,505 and for the year to date 136,567 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Week ending February 15th:—

BOUNDARY SHIPMENTS.

Mine.	Week.	Year
Granby	19,538	105,901
Other mines	.....	23
Total	19,538	105,924

ROSSLAND SHIPMENTS.

Centre Star	2,720	23,579
Le Roi	1,599	10,860
Le Roi No. 2	704	4,306
Evening Star	59	172
Total	5,142	38,917

SLOCAN KOOTENAY SHIPMENTS.

Sullivan	600	3,900
St. Eugene	534	3,385
[illegible]	22	22
Whitewater, milled	280	1,820
[illegible]	21	93
Queen, milled	185	1,100
La Plata	62	734
North Star	60	420
Vancouver	[illegible]	354
[illegible]	77	250
[illegible]	31	237
Nugget	37	169
[illegible]	21	105
[illegible]	25	50
Daily	43	43
[illegible]	32	32
Other mines		5,784
Total	2,052	13,478

The total shipments for the past week, were 26, 752, and for the year to date 163,319 tons.

Dominion Coal Company outputs, February 1st to 15th, 1908:—

	Tons.
No. 1	20,101
No. 2	30,279
No. 3	14,218
No. 4	11,624
No. 5	24,404
No. 6	8,603
No. 7	3.054
No. 8	5,823
No. 9	12,901
No. 10	2,712
	136,719

The Nova Scotia Steel & Coal Company reports for the year ended December 31, as compared with former years:—

	1907	1906.	1905.
Gross profits	$ 944,791	$ 960,281	$559,966
Intest on bonds	260,885	255,038	248,177
Balance	$ 677,906	$ 704,643	$311,729
Deprec. sinking fund, etc.	274,428	236,783	129,753
Net profit	$ 406,478	$ 467,830	$181,976
Pref. div.	82,400	82,400	82,400
Balance	$ 321,078	$ 385,460	$ 90,576
Com. div.	299,256	.....	.....
Sur. for year	$ 21,822	$ 385,400	$ 99,576
Prev. sur.	1,180,785	795,325	.....
Total surplus	$1,202,607	$1,180,785	.....

A despatch from Sydney, Australia, says that the gold yield of New South Wales, for January, amounted to 29,361 ounces, valued at £110,583, compared with 37,584 ounces, valued at £126,750, same month last year.

The British Columbia Copper Company has issued a statement for the year ending November 30th, 1907. The profit and loss account is as follows:—

Credits:

Balance December 1st, 1906,	$231,022
Premium on stock sales	57,116
Adjustment account	21,724
Income for year ended November 30, 1907,	88,155
Total	$398,018
Expenses	20,777
Net	$377,241
Dividends	201,200
Surplus	$176,041

PIG IRON PRODUCTION.

Philadelphia.—The American Iron & Steel Association has received from the manufacturers complete statistics of the production of all kinds of pig iron in the United States and Canada, in 1907. The total production in the United States was 25,781,361 tons, against 25,307,191 tons in 1906. In Canada the total production in 1907 amounted to 581,146 tons, against 541,957 in 1906.

The world's gold production for 1907, in contrast with 1906, as estimated by the Statist, shows a decrease of about £200,00 to £300,000. Of a total estimated output of a value of £82,200,000 for 1907, the Transvaal contributed £2,200,000 and Rhodesia £2,200,000 in round figures.

Market Reports.

New York Metal Market, February 24th:—

Pig iron, quiet; northern, $17 to $18.75; southern, $16.25 to $18.25. Copper, quiet, lakek, $12.62 1-2 to $12.87 1-2. Lead, quiet, $3.70 to $3.75. Tin, easy; Straits, $28.50 to $29.10. Plates, easy. Spelter, quiet; domestic, $4.70 to $4.75.

Price changes in metal at New York for the week ending February 15th were as follows:—

	High.	Low.	Close.
Copper, lake	13⅝	13¼	13¼
Copper, elec.	13½	13	13
Copper, casting	13¼	12.80	12.80
Lead, spot	3.70	3.70	3.70
Spelter, spot	4.82½	4.60	4.82½

The week's metal prices at London were as follows:—

	High.	Low.	Close.
Copper, spot	£60 0 0	£58 10 0	£58 10 0
Copper, futures	60 7 6	59 0 0	59 0 0
Lead, spot	14 10 0	14 3 9	14 3 9
Spelter, spot	23 0 0	20 13 0	22 0 0

Silver.—February 6th, 55 3-8 cents; February 7th, 55 7-8 cents; February 8th, 55 1-2 cents; February 10th, 57 5-8 cents; February 11th, 56 3-4 cents; February 13th, 57 1-4 cents; February 14th, 57 cents; February 15th, 55 7-8 cents; February 17th, 56 1-8 cents; February 18th, 56 1-2 cents; February 19th, 56 1-4 cents.

The Barret Manufacturing Company takes elaborate pains to supply every inquirer with a free sample of Amatite roofing in order to show what the famous mineral surface is like. This real mineral surface is firmly embedded into the top surface of the roofing and is, of course, practically indestructible by wind or weather, and can be exposed to the elements without fear of damage. Paint or coating is not needed for Amatite, and the manufacturers do not manufacture anything in the way of paint for use upon it. An Amatite roof, once laid in position upon a shaft house will stay there indefinitely without further care or attention of any kind. This is a vast improvement over the roofings which require a new coat of paint every two or three years; and if Amatite cost more than the other roofings it would still be worth while for this reason alone. Amatite, however, does not, in fact, cost as much as other roofings, and farmers who are preparing to roof any of their buildings should investigate it. The Barrett Manufacturing Company, New York, Chicago, Philadelphia, St. Louis, Cleveland, Allegheny, Cincinnati, Kansas City, Minneapolis, New Orleans, Boston, will send a sample on request.

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The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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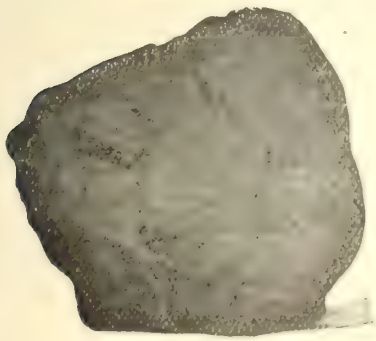
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Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc. **Ornamental and Structural Materials in abundant variety.** The Mining Law gives absolute security to title and has been specially framed for the encouragement of mining

All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St. Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries,
Parliament Buildings, Quebec.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

Before purchasing supplies, machinery or equipment, consult the firms mentioned in this Directory. They are prepared to fill your order with all possible despatch. If requiring anything not listed in these columns, address THE CANADIAN MINING JOURNAL and you will be put in touch with responsible firms. In writing advertisers, kindly mention this Journal.

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

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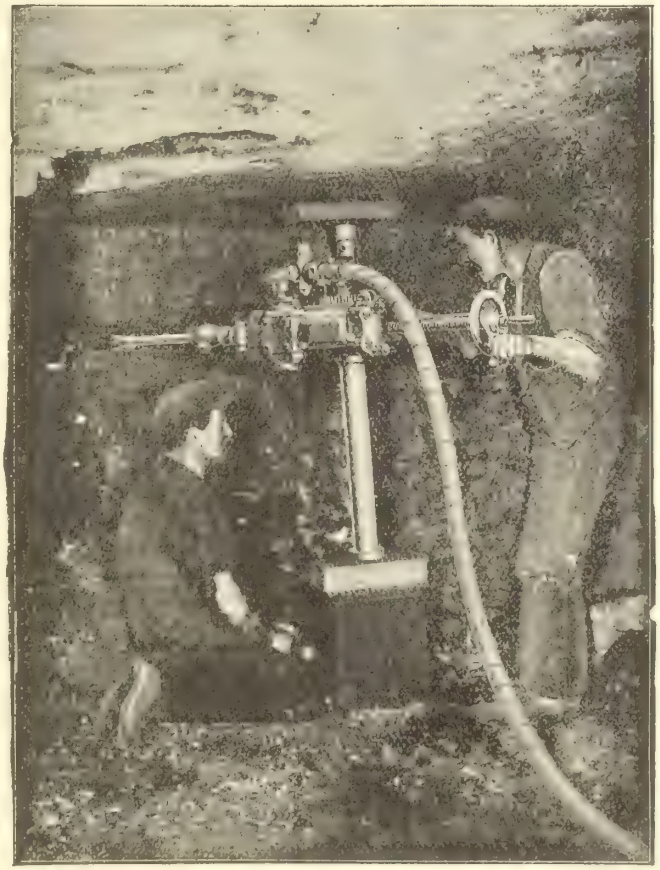
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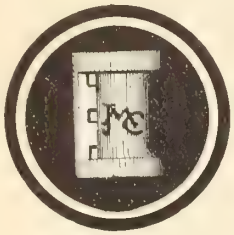
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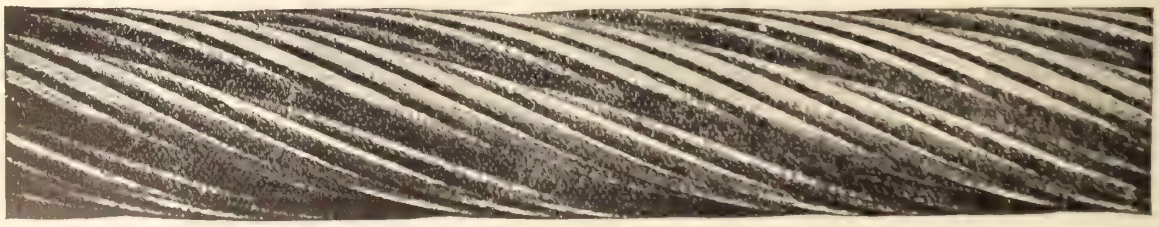


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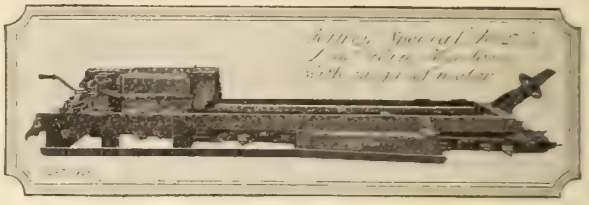
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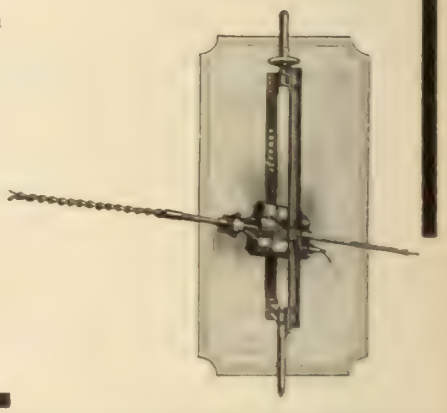
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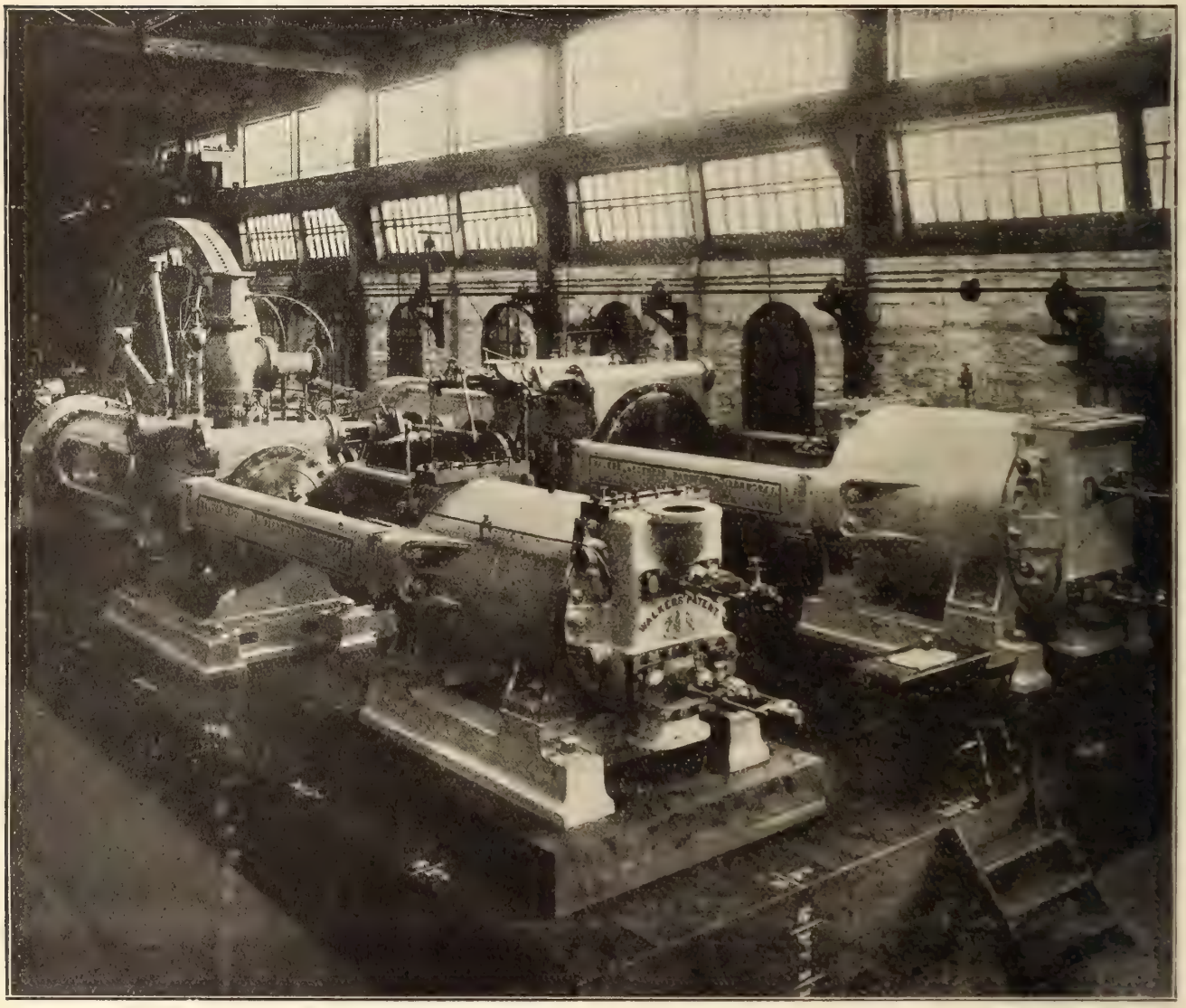
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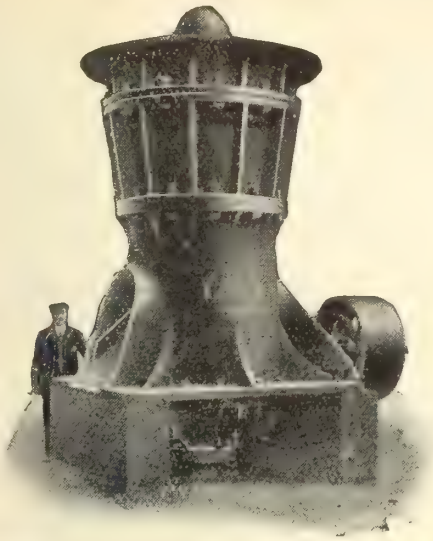
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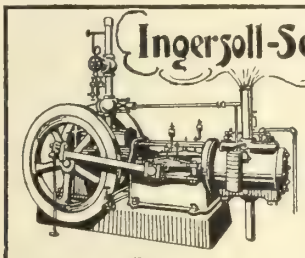
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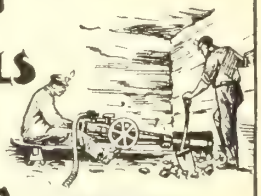
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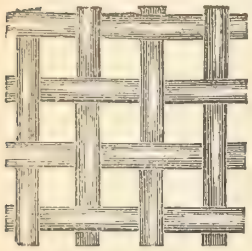
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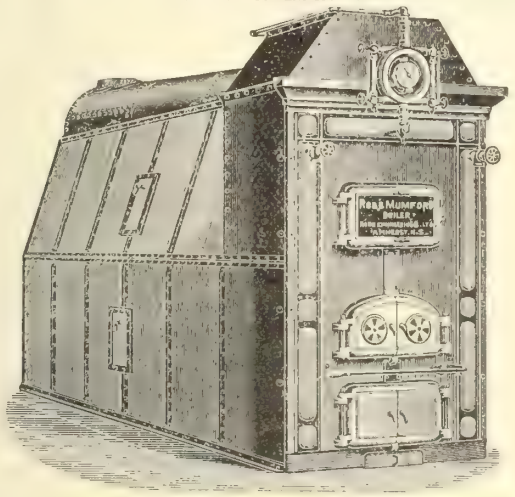
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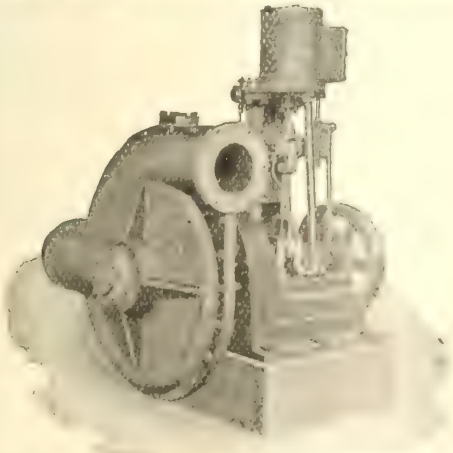
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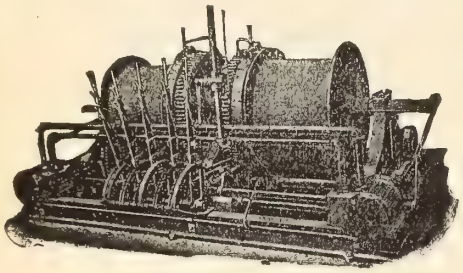
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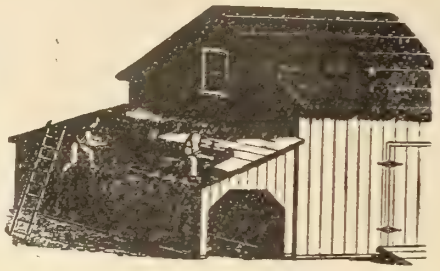
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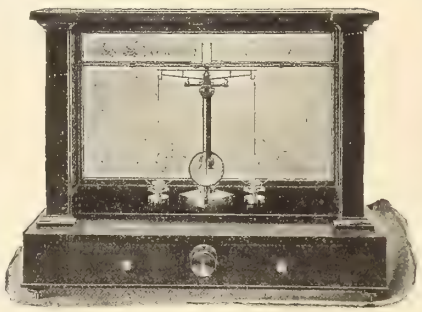
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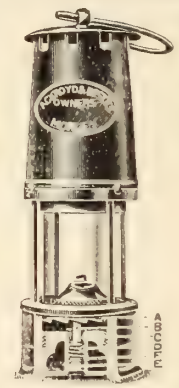
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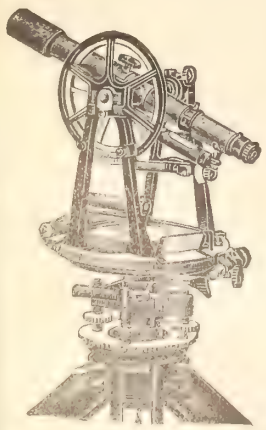
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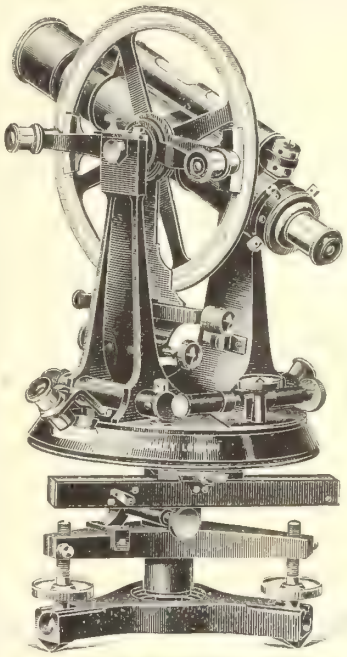
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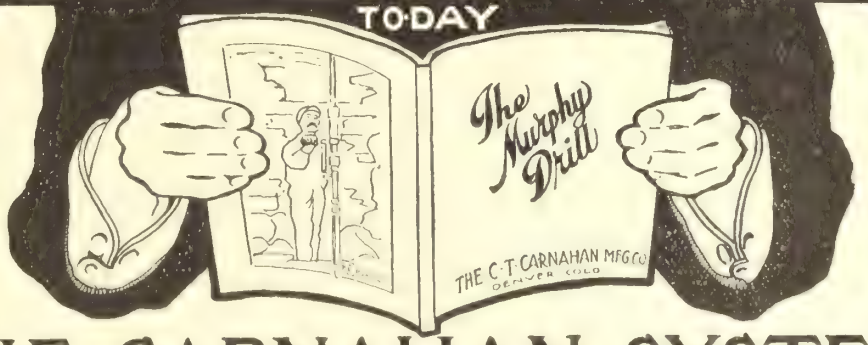
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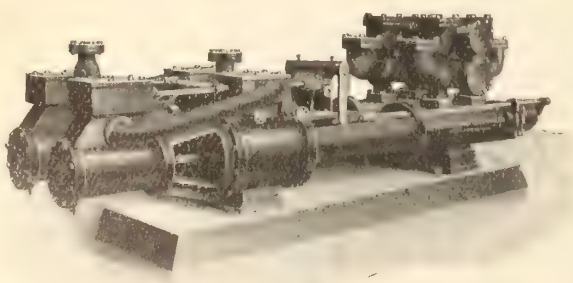
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CANADIAN MINING INSTITUTE.

In many senses the recent annual meeting of the Canadian Mining Institute was unique. In respect of attendance it established, we believe, a new record. British Columbia, Ontario and Quebec were heavily represented, although Nova Scotia sent but one or two members.

The vote registered was large, larger in fact than on any previous occasion. The papers were of wide range, were well presented and intelligently discussed. The introduction of the plan of presenting a brief verbal outline of each paper instead of reading it in its entirety is to be commended.

The arrangements in nearly every particular went much more smoothly than is usual. The business meetings, at which much spirit, but little acrimony, was manifested, were well conducted. The smoker and the dinner were heartily enjoyed. In fine, the whole session was on of good-fellowship and harmony.

To the success of this Tenth Annual Meeting there were at least three contributory causes—the Ottawa committee, which spared no pains to perfect every detail in the scheme of entertainment; the Secretary of the Institute; and THE CANADIAN MINING JOURNAL. We modestly place ourselves in this category of moving causes for the reason that we believe our efforts responsible for awakening the paid officials of the Institute to the necessity of bestirring themselves. To use a homespun metaphor, we were as turpentine upon drowsing steeds.

The faithfulness of the chairman, Past President Frederick Keffer, who attended the meeting at great inconvenience, should be inspiring to officers and members alike.

THE SOUTH AFRICAN MINING JOURNAL.

Our enterprising contemporary, *South African Mines, Commerce and Industries,* has decided to shorten its title to *South African Mining Journal.* There is no question as to the wisdom and expediency of this decision. The former name is cumbersome. The latter is succinct.

South African mining men are under a heavy obligation to their leading mining journal for its recent successful organizing of a series of air drill contests. Under its new name we wish the *South African Mining Journal* enlarged usefulness and continued prosperity.

TWO ESTIMATES.

In the *Mining World* of March 7th Mr. F. C. Nicholas takes exception to a polite request in a previous number of The Canadian Mining Journal for more information as to the way in which he obtained his valuation of the property and stock of the Bonanza Creek Gold Mining Company, Limited. As he accuses us of making "distorted quotations" from his article, we shall here quote from it verbatim.

"The gravel which can be worked is estimated at 30,000,000 superficial feet, and an average of 60 feet, with values in all of it placed at about $3 per foot, measured from a superficial foot to bed rock 60 feet below the surface. At this estimates there is nearly $90,000,000 gross in the property, equivalent to $257 gross for each of the 350,000 shares of the company's stock. Operating expenses are estimated at 60 to 90 cents per superficial foot to bed rock, with 20 per cent. added for contingent expenses, resulting in a prospective return of $164.56 net for each share. It is expected that it will take 30 to 40 years to work out the property, and at this rate the return expected is $4.11, or about 80 per cent. annually on the stock. The maximum expectation is rarely attained in any mine, and often years are required to develop full efficiency. Taking the risk at Bonanza Creek as 25 per cent. assured, there will be 20 per cent. annually for the stock, with prospects for even better returns."

With regard to this Mr. Nicholas says in his reply to our enquiry, "As to the data on which the article was was based I took them from reports made by members of my field staff who were with me last fall, but have now returned to Alaska, to be gone some time. In addition to these data I had information from parties interested in the property and from other engineers. From such information the article was written, and I am free to say that I endorse the reports made by the members of my staff with entire confidence.

"As to my estimates of share values to which The Canadian Mining Journal refers, the results are arrived at by careful investigations, such as I am constantly making for clients interested in mining securities. Naturally, my estimates of values are made by my own methods and on my own responsibility; and I am happy to say that a number of clients and others hold them in high esteem."

In order better to correlate this estimate with the estimate made by Mr. R. G. McConnell, of the Geological Survey of Canada, it is convenient to reduce the figures of quantity to cubic yards. Thus the amount of gravel here represented would therefore be roughly 66,000,000 cubic yards.

The property of the Bonanza Creek Gold Mining Company, Limited, appears to be located somewhere on the white gravel of the west side of the valley of Bonanza Creek, below the mouth of Adams gulch. But as there are also several other properties on the same side of the valley, this property does not cover the whole of the white gravel.

Mr. McConnell writes of this as follows:—

"The volumes of gravel on the Upper Bonanza and Eldorado hills are as follows:—

	Cubic yards.
Bunker Hill	1,050,000
French Hill	1,670,360
Gold Hill	3,684,940
Chechaco Hill	5,805,236
Adams Hill	7,561,370
Magnet Hill	485,672
American Hill	2,210,888
Orofino Hill	6,892,130
Monte Cristo Hill	3,710,490
King Solomon Hill	10,780,587
Boulder Hill	1,475,216
	45,326,889

Subtracting the quantity here stated as from Bunker Hill to Chechaco Hill, which are certainly higher up the valley of Bonanza Creek than the property of the Bonanza Creek Gold Mining Company, there remains, according to Mr. McConnell's determination a total of 33,116,352 cubic yards, only part of which is included in the property under consideration.

Continuing, Mr. McConnell writes:—

"A paystreak varying from 200 to over 400 feet in width has been traced trhough all these hills. It is partly destroyed in places, but on some of the hills, notably on Orofino and Monte Cristo, it is situated some distance back from the present secondary valley, and is entirely preserved.

"The paystreak is now practically drifted out, portions of it twice over, and is estimated to have yielded gold to the value of $24,000,000.

"Drifting operations, however, never result in a full extraction of the gold. A few pillars and occasional small areas are usually neglected for various causes; the bed rock is seldom thoroughly mined, and no attempt is, of course, made to recover the values in the upper lean gravels. The paystreak gravels are also bordered as a rule on both sides by considerable fringes of gravel, too lean to drift but rich enough in most cases to hydraulick.

"The gravels in the Upper Bonanza hills, considered rich enough to be hydraulicked at a profit, include all those in the original paystreak, those in a band behind the paystreak varying in width on the different hills from 100 to 200 feet, and those between the paystreak and the present valley.

"The gravels in the back portion of most of the hills are too lean to be worked by any method.

"The volumes of workable gravels on the various hills are estimated as follows:—

	Cubic yards.
Bunker	850,000
French	570,360
Gold	1,779,650
Chechaco	3,752,914
Adams	2,379,000
Magnet	395,677
American	1,989,218
Orofino	5,533,000
Monte Cristo	1,853,150
King Solomon	4,681,087
Boulder	332,000
	24,116,056

"The average values in these gravels are estimated at 34.05 cents per cubic yard and the amount of recoverable gold at $8,213,532."

Deducting as before the quantity of gravel on the hills from Bunker Hill to Chechaco Hill, there remains a total of 17,163,132 cubic yards as the total volume of the workable white gravel on the west side of Bonanza Creek. At Mr. McConnell's valuation of 34.05 cents per cubic yard, these have a total value of $5,844,046.

Mr. Nicholas says: "I wish to avoid a controversy in this matter." But a request for an explanation of the difference in his gross valuation of $90,000,000 for one property and $5,844,046 for it and several other properties together, previously made by an accredited official of the Canadian Government, is deserving of fuller consideration than he has seen fit to give it.

SAFETY LAMPS.

The evidence being gathered by the English Royal Commission on Safety in Mines, among other recommendations makes several bearing upon the use of safety lamps. One important witness urges that the screw-locked lamps be entirely done away with and that safety lamps be standardized as nearly as possible. In all fiery mines the use and distributed quantities of explosives should be strictly controlled, as also the kind of explosive.

THE TENTH ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE.

WEDNESDAY'S SESSION.

With every augury of success and with an exceptionally full registration of members, the Canadian Mining Institute opened its Tenth Annual Meeting at the Russell House, Ottawa, on the morning of Wednesday, March 4th. President Frederick Keffer, of Greenwood, B.C., presided. The attendance from Ontario, Quebec and British Columbia was more than usually heavy. Nova Scotia had but few representatives.

The Hon. William Templeman opened the first session on Wednesday morning with an address in which he dwelt appreciatively upon the work of the Institute and gave warm assurances of the support of the Department of Mines.

The following papers were read and discussed: "The Classification of Coal," by D. B. Dowling, Ottawa; "The Carbon Minerals of New Brunswick," Dr. R. W. Ells, Ottawa; "Secondary Mining Education," H. H. Stoek, editor of *Mines and Minerals*, Scranton, Pa.; and "Compilation of Mining Statistics," J. McLeish, Ottawa.

The paper read by Mr. D. B. Dowling on "The Classification of Coals" gave rise to much discussion, the result of which was that the President was requested to appoint a committee of five to investigate and report upon the laboratory methods of coal analysis. Dr. Ells' and Mr. McLeish's papers were also sources of profitable argument. After the methods of compiling mineral statistics in vogue in Ontario, Quebec and British Columbia had been taken up by Messrs. T. W. Gibson, J. Obalski and Dr. J. E. Woodman, it was resolved to request the Dominion Government to take the steps necessary to calling together representatives from each of the Provincial Governments for the purpose of comparing and unifying the various divergent methods now in use. The afternoon and evening were also filled out with the reading and discussion of papers. The evening papers were illustrated by lantern slides. The slides prepared and used by Mr. D. B. Dowling in his paper on "Yellowhead Pass" were the subject of much favorable comment. Mr. E. D. Ingalls' paper on a "System of Conventional Signs for Showing Mineral Occurrences on Mapes, etc.," also illustrated by slides, was original and ingenious.

THURSDAY'S SESSIONS.

The President's annual address included mention of the approaching visit of the British Iron and Steel Institute, to the increase in membership from 500 to 700 members during the year, and to the proposed establishment of technical libraries in mining centres.

The Treasurer's report, presented by Mr. J. Stevenson Brown, Montreal, showed the gross receipts for the year, including a balance of $1,354 from 1906, of $11,396. The disbursements amounted to $7,923, leaving a balance on hand of $3,472. The receipts included a Dominion Government grant of $3,000, a Provincial grant of $1,500, and membership fees, $4,362.

After debate it was decided to change the form of the Treasurer's report so as to make it more specific and detailed.

The report of the Secretary, Mr. H. Mortimer Lamb, referred to the establishment of three branches of the Institute: Western men at Nelson, with Mr. A. B. W. Hodges, Grand Forks, as President, and Mr. E. Jacobs, Victoria, Secretary; Cobalt Institute, Mr. A. A. Cole,

President and Mr. G. R. Harty, Secretary; and the Eastern Branch, at Montreal, with Mr. George E. Drummond as President and Mr. J. W. Bell as Secretary. Appreciation was expressed at the formation of the Federal Department of Mines and the increase of the Federal Government grant to the Institute from $3,000 to $5,000. Mr. Lamb reported that Mr. Frank E. Lathe, of McGill University had been awarded the President's gold medal for the best paper by a student member.

In the afternoon more papers were read. The evening was taken up with a thoroughly enjoyable smoker, arranged by the members of the Ottawa committee. The outstanding feature of the evening was the monologue given by Mr. Gordon Rogers and entitled "Mr. Dooley on Mining." Mr. Dooley's experience in the profession extended from buying "gumdrop" stock to sending a four-pound package of manuscript to THE CANADIAN MINING JOURNAL and having it returned collect.

FRIDAY'S SESSIONS.

The ballot box had closed at 6 p.m. on Thursday and results were expected early Friday morning. This, however, was not to be. The large number of nominations and the ingenious complexity of the ballot form made the work of the scrutineers, Messrs. Brock, Wilson and Hobart, excessively tiresome.



Dr. Willett G. Miller, President C.M.I.

On Friday morning the Institute unanimously placed itself on record as in favour of the renewal of the Dominion lead bounty. In discussing the motion, it was pointed out by Mr. J. C. Murray, editor of THE CANADIAN MINING JOURNAL, that the British Columbia Provincial coal tax, recently imposed upon the coal and coke of British Columbia, had a vital bearing upon the lead bounty. The tax itself would fall ultimately upon the metalliferous mines and would, in a sense, tend to neutralize the bounty. Hence both questions should be considered together.

The motion regarding the bounty was worded thus:—

"That this meeting, in continuation of the policy in the past, endorse the request of the lead miners and smelters of British Columbia, now before the Government, for an extension of the lead bounty act for a further period of five years, with an increase in the minimum price of lead fixed by the bounty from $80 to $90 per 2,240 pounds."

The President is to appoint a committee to lay the matter before the Minister of Trade and Commerce.

Among other business transacted on Friday was the passage of the motion of Dr. A. E. Barlow, that a vote be taken by letter ballot on the proposed removal of the headquarters of the Institute from Montreal to Ottawa. Mr. John E. Hardman and Dr. Barlow were appointed a committee to write a circular explaining the reasons for and against the proposed change.

On motion of Mr. J. B. Tyrrell, seconded by Dr. T. L. Walker, it was decided to request the railways to grant reduced rates to prospectors. Prospectors were defined as the holders of mining licenses.

The reading of technical papers concluded the afternoon's work.

About six o'clock the results of the elections were announced as follows:—

President—Dr. W. G. Miller, Toronto.

Vice-Presidents—Mr. G. E. Drummond, Montreal; Mr. W. Fleet Robertson, Victoria, B.C.; Dr. A.E. Barlow.

Secretary—Mr. H. Mortimer-Lamb, Montreal.

Treasurer—Mr. J. Stevenson Brown, Montreal.

Councillors—Mr. W. M. Brewer, Victoria, B.C.; Mr. Arthur A. Cole, Cobalt, Ont.; Mr. D. H. Drury, Montreal, Que.; Mr. Chas. Fergie, Glace Bay, N.S.; Mr. J. E. Hardman, Montreal, Que.; Mr. R. T. Hopper, Montreal, Que.; Mr. A. J. McNab, Trail, B.C.; Mr. W. F. C. Parsons, Londonderry, N.S.; Mr. D. W. Robb, Amherst, N.S.; Mr. O. B. Smith, Phoenix, B.C.; Mr. R. H. Stewart, Rossland, B.C.; Mr. J. B. Tyrrell, Toronto, Ont.

The Annual Dinner, on Friday evening, concluded the best convention that the Institute has ever held.

Mining Science, February 20th.—Continuing his articles on slime concentration practice, Edwin A. Sperry writes of dewatering in this issue of *Mining Science.* Since there is mechanical loss wherever there is a current, Mr. Sperry believes that the use of canvas strakes, or "rag plants" are not as economical as settling tanks for dewatering. Two instances are cited. In one mill 180 tons of ore was crushed. The mill tails were screened on 20 mesh shaking screens. The undersize went to settling tanks, the overflow from which was 60 mesh and finer. This product amounted to 65 tons in 24 hours, carrying 4.7 per cent. of lead. 13.16 tons was caught in canvas and 51.84 tons wasted as tails. 48.4 per cent. of the total lead was wasted with the tails. 90.7 per cent. of the total lead would pass 200 mesh screen and, taking the retreatment of the canvas plant heads as a criterion, 80 per cent. of this could have been saved by dewatering and slime table treatment.

Other good points are made in the article. The conical Callow tank, 7 feet 7 inches high, with an effective width at the top of 8 feet, has a settling capacity of 20 gallons per minute in volume. The capacity for solid material depends, of course, upon the consistence of the pulp. With 10 per cent. solids 20 to 25 tons per 24 hours should be handled.

The liability of choking taking place at the apex of conical settling tanks is met by attracting an auxiliary chamber to the side of the tank in the form of a long tube having an opening into the tank for almost its entire length. The lower end is closed. At the upper end is a gland through which is inserted a pipe, the lower end of which reaches nearly to the lower end of the auxiliary chamber. This pipe is used as the draw off. It can be so manipulated as to remove clogging.

A CANADIAN METHOD FOR THE TECHNICAL DETERMINATION OF SILICON IN PIG IRON.

By Randolph Bolling.

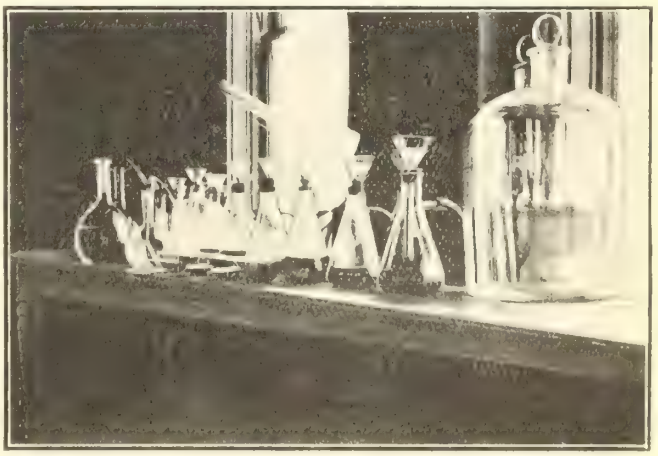
Chemist, Nova Scotia Steel & Coal Company, Sydney Mines, N.S.

The writer contributes this article for the analytical readers and for the practical works chemist who is often required to perform much and to whom time is a necessary consideration.

On reading the interesting article in The Journal of January 15th on pig iron analysis, I was struck with the fact that the directions for the determination of silicon as given by the American Foundryman's Association could not be used in ordinary routine analysis at blast furnaces, except at great expense of time. A modern furnace makes from six to eight casts per day, and half of these are made during the night. The chemist usually finds three or four samples awaiting ananlysis in the morning, so that orders calling for certain grades of iron may be filled immediately, without rehandling. If one follows the foundryman's method (the American system), the hydrofluoric acid treatment of the residue would consume at least an hour beyond the actual time required for the other chemical reactions to separate silica from pig iron. The hydrofluoric treatment of the residue, in order to volatilize all of the silica, would appear necessary from a theoretical standpoint, as the argument could be advanced that the residue left after the solution, dehydration, and combustion would be contaminated with other substances than silica. Practical experiments by the writer extending over ten years on pig iron made in different localities in the United States and Canada show that under certain operating conditions, which I will describe later, not the smallest trace of any element except silicon was found in the residue. It volatilized completely when moistened with sulphuric acid and heated with a few cubic centimeters of hydrofluoric acid. The importance of this statement can be appreciated when it is recalled that silicon is the expensive constituent in pig iron. The difference of only one per cent. of this element in pig iron means a variation of from $3 to $4 per ton to the blast furnace. For instance, No. 4 usually contains from 0.85 to 1.20 per cent. silicon, No. 1 iron contains from 2.70 to 3.50 per cent. When iron is sold strictly on analysis No. 1 iron will always command from $3 to $4 higher per ton than No. 4. You may ask, why do the market prices of grades vary? The answer is simple—coke. In order that a blast furnace may produce No. 1 or comparatively speaking high silicon iron, the furnace manager is compelled in blast furnace parlance "to lighten the burden." This means that if he is running on basic, or No. 4, iron, with a certain ratio of coke to limestone and ore, he must reduce the weight of ore and limestone, *i.e.*, increase the ratio of coke to the rest of the charge in order that a higher temperature may develop in the zone of fusion in the blast furnace, reducing a greater amount of silica in this charge to silicon in the pig iron. and raising the percentage of silicon in the pig metal. The increase being a measure of the fuel used, it follows that the higher the silicon, the higher the cost of the metal producer, because of the increase in the cost of fuel. It thus follows that the accurate determination of the silicon contents of each cast is a matter of prime importance. The method the writer uses is a modification of the one suggested several years ago by Prof. Drown, of the Massachusetts Institute of Technology, which became very popular owing to the simplicity of the operating details and the rapidity and accuracy attained. In fact, its use is almost universal.

Method for Silicon Used in Nova Scotia Steel & Coal Companys' Laboratory.

A representative sample composed of fine drillings having been secured, a triple factor weight 1.4106 grams is carefully weighed on an analytical balance sensible to 1-20 mg. The sample must be picked up with a magnet of the horseshoe type from a sheet of paper in order that no sand from the skin of the sample pig should contaminate the sample when it was being drilled, previous to the weighing operation. This weighed portion is next brushed into a No. 3A Royal Berlin porcelain casserole, or other brand of casserole, which will hold approximately 300 c. cm. up to the spout. A clock glass of about 5 inches in diameter is placed on the casserole. Solution of the metal is now affected on a hot plate,



Heavy Glass Side Tube Erlenmeyer Flask Attached by Hose to Suction.

either electrically heated or by gas burner, by silicon mixture, which is prepared, viz.:

A No. 10 breaker is filled with 1200 c. cm. of distilled water. To this is added one liter of nitric acid, sp. gr. 1.42 C.P., and this mixture stirred with a glass rod. Now add in a very fine stream with vigorous stirring 400 c. cm. of sulphuric acid 1.84 sp. gr. C.P. The operation is best conducted in a sink with six or eight inches of water, as a very great rise in temperature follows the action of the sulphuric acid on aquous solutions. This is the best silicon mixture formula. There is sufficient sulphuric acid to completely dehydrate the silica formed by the oxydizing action of the nitric acid. The triple fact or weight of metal requires 25 c.cm. of this mixture. The casserole is heated on the hot plate, so that a brisk effervescence of nitrous acid (deep brown fumes) proceeds without the contents boiling over. After ten or fifteen minutes solution is affected and is noted by a disappearance of the brown fumes and the solution subsides in the casserole and boils quietly. It is now ready for

an increase in temperature, a blue flame bunsen under a wire gauze is just the requisite heat, and the casserole is transferred from the hot place to the red hot gauze. The solution boils rapidly with a steady jet of steam issuing from the spout, the water is quickly evaporated, and as the last portions are driven out a slight spatter is heard to proceed from the casserole as a bumping action throws a little of the ferric sulphate and silica off the bottom against the glass cover. At this point dense white clouds of sulphuric anhydride are expelled and are quite readily manifested by an irritation of the operator's respiratory passages with a slight cough. This



Electric Hot Plate and Bunsen Burners.

is usually avoided by working under a laboratory fume hood with induced draught. A single drop of strong acid distilled from the residue will condense on the cooler cover and fall back again on the hot bottom of the casserole, with a hissing sound. This is the signal for removing the casserole from the flame and allowing it to cool. The residue is composed of anhydrous ferric sulphate, silica, a little scale sometimes, and iron phosphate, manganese sulphate and graphite. Hot water is now added to the extent of 200 c. cm. and the casserole again boiled. After solution of all soluble salts is observed 50 c. cm. of hydrochloric acid is added and the boiling continued, in order to dissolve all iron compounds, insoluble in hot water, taking care to note if any particles show hydrogen bubbles, a sign that too coarse drillings have been used. If all is dissolved a liter erlenmeyer heavy glass side neck flask, with platinum cone and 3 inch funnel is fitted with a nine centimeter analytical filter paper. The S. & S. brand, black ribbon, is a favorite for this determination. The aspirator is started and the acid solution filtered and transferred by water jet from a washing flask. Some silica and graphite still adhere to the bottom and sides of the casserole. The most effective way to remove this deposit is to carefully cleanse the middle finger and gently rub the interior of the casserole until it appears perfectly white and clean. Rinsing off the tip of the finger with the water jet removes every particle of the adhering silica and graphite. Wash the funnel with hot water until all yellow ferric chloride is removed; then wash once with hydrochloric acid of 1.05 sp. gr. Any ferric salts will betray themselves at this point by a yellow discoloration on the paper or just back of the paper at its juncture with the glass walls of the funnel. Wash until every trace of ferric salts is removed. Remove acid from paper by three systematic hot water washings and allow the paper and residue to remain in the funnel to get rid of as much water as possible. A few minutes' suction does this. Remove filter paper and residue to a small 8 or 10 c.cm. weighed platinum crucible and heat over a small flame until the paper is charred. Now bring the crucible to incandescent heat over an air-gas blow pipe, and at the same time introduce a slow stream of oxygen gas through a tube in order to promote rapid combustion of the graphite. After the glow ceases, continue to heat and stir with a platinum rod until the silica appears white. Cool in a dessicator over dry calcium chloride, weigh, divide the weight of silica found by 3 and multiply by 100. The result is the per cent. of silicon in the sample. Oxygen compressed in steel tanks for calcium light apparatus is the most convenient source of gas and is cheap, its use for this purpose being distinctly novel.

Editor's Note.—Alternate washings with dilute ammonia, hot water, and dilute hydrochloric acid are to be recommended here.

MODES OF OCCURRENCE OF CANADIAN GRAPHITE.*

By H. P. H. Brumell, Buckingham, Que.

(Ottawa Meeting, 1908.)

Outside of those directly interested in the mining or geology of graphite the impression seems to prevail that this mineral invariably occurs in veins or nondescript masses. In view of the fact that all our deposits of permanent value are those of disseminated ore, the writer has undertaken to put together this brief paper on the subject with the hope that those interested in the industry will devote a little more attention to the development of some of our enormous deposits of comparatively low percentage disseminated ore, rather than to the exploitation of the higher percentage, and almost invariably erratic, deposits of so-called "pure lump."

The only ore under consideration in this paper is that found in the Archæan rocks from which, solely, do we obtain any of the crystalline or flake variety, and the area covered will be that in which so much work has been done in the counties of Labelle and Argenteuil, in the Province of Quebec. In the former county the graphite is found most prominently in a more or less wide band of gneiss appearing near the front of the township of Templeton, whence it extends in a northeasterly direction into the township of Buckingham between the fourth and tenth ranges across which it sweeps, in a general easterly direction, into the township of Lochaber, where it turns again to the northeast, and so passes into the township of Mulgrave. In the county of Argenteuil the graphite occurs, almost invariably, in the limestones which are very strongly developed in the township of Grenville and these town-

*Journal of the Canadian Mining Institute. Part of Vol. XI.

ships to the north. These bands of limestone are bounded by large porphyry and syenite mass to the east, and by the granites of the Rouge River to the west. It will thus be seen that in these two countries the mineral occurs in two very distinctly different rocks. Not only do the rocks differ, but the ore also, that of Labelle county being mainly a disseminated ore, while that of Argenteuil occurs in veins and segregated masses; although the limestones, in the vicinity of these deposits, are often impregnated with disseminated scales of graphite to a considerable distance from the ore body.

To treat the subject in a broad sense and for convenience in this paper, the modes of occurrence may be briefly summarized as follows:—

1st. As disseminated ore, where the graphite occurs in small, bright, scaly crypto-crystalline particles, in a grey or red weathering gneiss, the particles lying parallel to the apparent stratification, or in larger similar particles in quartzite or coarse grained granite.

2nd. In the form of true fissure veins, usually cutting diorite or other eruptives.

3rd. As veins or irregular masses and contact reposits in limestone.

Of these three very distinct modes of occurrence the most important is, beyond all doubt, the first. These gneisses are very distinctly foliated and consist essentially of quartz and orthoclase with sillimanite, hornblende, pyroxene and pyrite, the latter mineral on weathering giving a reddish rusty appearance to the rocks. Interstratified with the gneisses are bands of crystalline limestone, frequently lenticular and not usually of great thickness. Dr. R. W. Ells—"Bulletin on Graphite"—says of the disseminated ores of Labelle county:—"The occurrence and association of the mineral are to a large extent the same at most of the places indicated. Certain local conditions are found here and there which must be considered in any mining scheme proposed, but generally it may be said that the chief attention as regards future developments must be made in connection with large bodies of the disseminated flake graphite, as promising the most steadfast returns. Though the vein form frequently occurs at most of the points where attempts to work the graphite have been made, and has shown in such cases a mineral of great purity, the uncertainty of such deposits is such that, by itself, the employment of capital on a large scale would scarcely be warranted. . . .

"The most persistent of the graphite deposits, however, are those which are found as disseminated flake. In the Buckingham district, this variety is found usually in the grey mica gneiss in bands or beds, which sometimes have a thickness of from ten to fifteen feet, or in places even more, as well as in limestone. In some of these beds the graphite is very thickly distributed, and the rock is quite black from its presence, indicating a high percentage of the mineral. Several assays were made by Dr. Hoffmann in the Survey laboratory, some years ago, which were published in the report for 1876-77, and are as follows:—

'A specimen of disseminated ore from lot 28, range VI, Buckingham, owned by the Montreal Plumbago Company, the sample being regarded as a fair average of one of the largest and most extensively worked beds in the area, with a breadth of eight feet, gave by assay, graphite, 27.518; rock matter, 72.438 per cent. A sample from lot 22, range VI, Buckingham Mining Company, gave graphite, 22.385; rock matter, 75.875 per cent. Specimens from lot 20, range VIII, gave graphite, 23.798; rock matter, 75.026 per cent.; and from lot 23, range VI, graphite 30.516; rock matter, 69.349 per cent. In all the above occurrences the amount of disseminated ore seems to be large, and in some the presence of the vein variety is also recognized.

'It must not be supposed that all the disseminated ore occurs in beds as rich as those just mentioned, but at very many points deposits exist which give amounts of flake from large bodies of ore, which range from 10 to 15 per cent. or even higher.' "

The foregoing is a very terse and accurate statement of facts, and it is to ores of this description that the energies of those at present engaged in the business are being bent. Already several extensive and characteristic deposits have been developed, notably those of the late North American Graphite Company, the Buckingham Graphite Company and the Bell Mines, all in Buckingham township, on whose properties are one or more extensive beds of graphite gneiss, assaying from 20 to 30 per cent. of graphitic carbon.

A very noticeable characteristic of most of the beds in the district is found at or near their contact with any of the later eruptives, where there is usually a very pronounced enrichment in graphite. This phase of the subject, however, need not be dwelt upon here.

Regarding the second or vein form of occurrence, but little need be said except that the deposits are true fisure veins, usually, in Labelle county, in diorite, at times continuing into the gneiss; in rare instances these veins have been noted in granite, pegmatite, pyroxenite and felsite. The graphite, which is of exceptional purity, occurs in fibrous and foliated forms, the fibres and plates lying at right angles to the enclosing walls, though in some rare instances the fibres and plates occur almost parallel to the walls and have the appearance of having drawn out by some dynamic action. In the latter instance the ore is usually harsh and lack—lustre. In one of the many veins opened on Lake Terror, where the ore occurs in a felsite, a vein of fibrous graphite about two inches in width gave every evidence of intense lateral pressure, the fibres being bent at the centre forming an angle of about 60 degrees without breaking the fibre. Of the purity of the vein graphite of Labelle county, the following assays by G. C. Hoffmann bear ample testimony.

"Vein graphite, foliated.—From a vein running through lots twenty-one and twenty-two of the seventh range of Buckingham. The structure of this graphite was massive, dense, made up of broad and thick laminæ. Color dark steel grey. Lustre metallic. Specific gravity 2.2689, (containing 0.147 per cent. ash). Its composition was found to be as follows:—

Carbon	99.675
Ash	0.147
Volatile matter	0.178
	100.000

"Vein graphite, columnar.—From the twenty-seventh lot of the sixth range of Buckingham. Structure of the graphite, compact, columnar; the columnar structure is usually erect, and at right angles to the surface upon which it occurs; in some instances, however, it is curved as though from pressure. The graphite breaks readily in the direction of the structure into more or less angular aggregates, each aggregate being made up of thin, narrow folia of very uniform width. The length of the columns varied in different specimens from about one

and a half to eight centimetres. In this specimen the foreign mineral matter was very evenly distributed through the structure of, and as a film upon, the graphite, so that on incineration the residual ash formed a tolerably perfect cast of the fragment employed. Color of untarnished foliae, dark steel grey. Lustre metallic. Specific gravity 2.2679 (containing 1.780 per cent. ash). Its composition was found to be as follows:—

Carbon	97.626
Ash	1.780
Volatile matter	0.594
	100.000

Economically this form of graphite has not proved itself of value. The veins are small and very irregular, in no instance exhibiting any appreciable degree of persistence as to size, veins which, on discovery, appeared to warrant systematic operations, invariably pinching out or running off into numerous small pockets and stringers. Many attempts have been made to operate these deposits, but in no instance, within the knowledge of the writer, has the venture proved profitable.

In treating of the third mode of occurrence, that of deposits in crystalline limestone, as illustrated by all of those of Argenteuil county, it is, by reason of the small amount of development work done, extremely difficult to accurately describe the ore bodies. Scattered through the limestone are numerous irregular masses of a very pure foliated graphite, at times having all the appearance of true veins, though more frequently appearing as contact deposits in the neighborhood of small eruptive masses and dykes which cut the limestone at many points.

In writing of the property of the National Graphite Company, lot 9, range V, Grenville township, Dr. R. W. Ells describes a typical deposit as follows:—

"The country rock is for the most part crystalline limestone, which is cut by granite and other instrusives. The graphite usually occurs irregularly at, or near, the contact of the limestone with granite or diabase dykes, both rocks being present in the openings, also in irregular vein forms, which are massive rather than columnar in character, ranging in thickness from fifteen inches to two feet. These are not solid, but apparently sometimes in dyke matter.

"Several openings have been made on the property. In the main pit the rocks are limestone with bands of rusty gneiss, which are traveresed by a white granite dyke and this in turn by a dyke of light green diabase. The graphite occurs principally in two irregular veins, and also in the granite mass, and these is a small vein on the edge of the diabase. The veins are shattered and mixed with a whitish, sometimes reddish, granite.

"The granitic looking rock has somewhat the aspect of a vein in some respects rather than a true dyke. It carries several minerals including scapolite, hornblende, graphite, pyroxene, pyrite, apatite and others. South of the principal opening, where mining has been carried on, the surface rocks for some distance appear to be all limestone, and in several small prospecting pits, sunk in this rock, a small percentage of disseminated flake graphite was observed."

The ore of Argenteuil county is of a very high degree of purity as is evidenced by the following assays by G. C. Hoffmann:—

"Vein graphite, foliated.—From the north half of the third lot of the second range of the Augmentation of Grenville. An exposure here was at one time mined to a small extent. At the opening of the excavation it showed a thickness of about ten inches, but the pure graphite was found to form a lenticular mass, which appeared to be separated from other masses of the same character by intervals, in which the graphite became intermixed with the limestone. Structure massive, dense, made up of broad and thick laminæ, closely interlocking each other at diverging angles, thus presenting a radiated arrangement, the sides of the vein forming the basal line. Color, dark steel grey. Lustre metallic. Specific gravity 2.2714 (containing 0.076 per cent. ash). Its composition was found to be as follows:—

Carbon	99.815
Ash	0.076
Volatile matter	0.109
	100.000

The graphite, as well as occuring in veins and contact deposits of various forms, is found at times in the limestone in the shape of almost perfect spheres, concretionary in form, the plates of fibres of graphite radiating from a centre consisting of a small particle of quartz or other foreign mineral. These concretionary spheres range in size from about one-tenth of an inch to two inches in diameter, and do not appear to follow any apparent bedding of the limestone, but to be scattered irregularly therein.

In summing up the three modes of occurrence it is not thought necessary to draw attention to specific failures to operate profitably the last two classes of deposits, but it may be said, in a general way, that, without exception, no deposit of vein or "pure lump" graphite has been found, on development, to be worthy of consideration as a commercial venture.

This conclusion was foreshadowed by Sir W. E. Logan who, in 1866, concluded his report to the Geological Survey by saying:—"The veins of this mineral hitherto found in the rocks of this country, although affording a very pure material, appear to be too limited and too irregular to be exclusively relied on for mining purposes, which should rather be directed to making available the large quantities of graphite, which, as we have seen, are disseminated in certain beds."

The *Iron and Coal Trades Review*, February 28th.—In an editorial on the eight hours question, the *Review* demonstrates that there is no reasonable analogy between the miners' eight hour bill and other measures designed to promote the welfare of miners. As to the certain effects of this bill it is shown that, whilst safety will not be increased, output will be lessened and the enhanced cost of production will react very strongly upon the market price. Moreover, many mines now working thin seams will be unable to face competition and will therefore be closed, thus throwing hundreds of workers out of employment. This argument is strengthened by the fact that not only is the cost of producing a ton of coal increasing under present condition; but the per capita output of the mines is decreasing. And this is the case in spite of vastly improved appliances, equipment, sanitation and transportation.

NOTES ON COST OF DIAMOND DRILLING IN THE BOUNDARY DISTRICT.*

BY FREDERICK KEFFER, Greenwood, B.C.

(Nelson Meeting, January, 1908.)

Two years ago I contributed to the Institute a paper on the results of diamond drilling as carried on at the mines of the British Columbia Copper Company, Limited, during 1905. That paper gave some details as to costs, and the period covered was but eight and one-half months. Since that year drilling has been carried on more or less continuously in the mines of the company, and the results of this work, so far as progress and costs are concerned, are given in detail in the following tables.

The Progress Table gives the monthly results of work as well as the yearly totals. It is of course important to know the general character of the rock drilled in order to institute comparisons with other localities. In the narrow limits of this table it is not possible to give details as to rocks, but as nearly as possible the rocks comprise diorites, compact garnetites and certain very hard and silicious eruptives occurring in Summit camp. The medium hard rocks include all ores, and, in Deadwood camp, much of the greenstone country. The soft rocks are the limestones, porphyries and serpentines. Of all rocks drilled the garnetites proved much the most severe in diamond consumption, as is illustrated by the work from May to August, 1907, which was mainly conducted in garnetite with some silicious limestones.

Eight hours constitute a shift underground, and nine hours on the surface. On Sundays no work is done apart from repairs to machinery. In May, 1906, the labor was contracted as an experiment, but was abandoned as being unsatisfactory.

The Cost Table gives details of costs under the four groups of Labor, Power, Repairs, Oils, etc., and diamonds. The employees were, normally, a runner and a setter. Extra help was required at times for blasting places for good set ups, for laying pipe lines, moving plant, etc. In August, 1907, two shifts were employed. In June and July of that year the increase in labor costs is mainly on account of the long pipe lines required. The power consumed is taken as being equivalent to that required for a 3 1-4 inch machine drill, that is to say, about 20 h.p. When drilling at a mine, where for example 15 machines are used on each shift, the diamond drill is charged with 1-31 of the total power costs—it being in this instance run on one shaft only.

Where steam power is used either directly or through a steam driven air compressor, the costs are much increased. Where, as in some cases, an isolated 24 h.p.

*Journal of the Canadian Mining Institute. Part of Vol. XI.

PROGRESS TABLE.

Date	Depth of Holes. Vertical feet.	Horizontal feet.	Total feet.	Hours actual drilling.	Hours moving to new holes, setting bits, etc., etc.	Total hours	Number of holes.	shifts	Feet per shift.	Feet per drilling hour.	Character of Rock.		Remarks.
1906													No.
Jan.	170	0	170	106	46	152	6	19	8.94	1.60	Mainly hard diabase	1	1=Hard rocks
Feb.	0	191	191	104	24	128	3	16	11.93	1.83	Softer lime rock	3	2=Medium hard rocks
													3=Soft rocks
March	332	66	398	205	77	282	5	33	12.06	1.94	Equal parts of above rocks	2	
April	214	0	214	76	55	131	7	16	13.37	2.81	Lime rocks and ore	2	
*May.	390	73	463				4				Nearly all in ore	2	
June			0										No work in June and
July.			0										July.
Aug.	0	508	508	160	48	208	7	26	19.59	3.17	Fairly hard rock	2	
Sept.	0	96	96	29	3	32	0	4	24.00	.31	Mainly ore	2	Drill men off on vacation.
Oct.	195	40	235	95	53	148	4	17	13.82	2.45	do.	2	
Nov.	33	378	411	157	63	220	6	27	15.22	2.62	Hard silicious rock	1	
Dec.	189	127	316	144	48	192	3	24	13.17	2.19	do. do.	1	
	1523	1479	3002	1076	417	1493	45	182	Av. 13.59	Av. C. .359			C.—Averages calculated on 3002 ft. *less* 463 drilled on contract.
1907													
Jan.	246	165	411	159	57	216	6	27	15.22	2.58	Lime and porphyry	3	
Feb.	0	378	378	137	79 D	216	2	27	14.00	2.76	Ore and lime rock	2	D.—Several days lost moving 15 miles to another mine
March	200	340	540	180	28	208	5	26	20.77	3.00	do. do.	2	
April	278	186	464	181	27	208	1	26	17.86	2.56	do. do.	2	
May.	67	433	500	163	53	216	3	27	18.52	3.07	Hard garnetite	1	
June	189	288	477	187	39	226	6	26	18.34	2.55	Very hard garnetite	1	
July.	96	304	400	203	23	226	6	27	14.81	1.97	do. do. and diorites	1	B.—Much trouble with caving ground in August. Worked two shifts nearly all the month.
Aug.	497	0	497	213	129B.	342	8	38	13.18	2.33	do. do.	1	
	1573	2094	3667	1423	435	1858	37	224	Av. 16.34	Av. 2.577			

(*) This month's work was contracted as to the labor. Feet drilled are therefore not included in averages, as contractor worked overtime.

boiler was used, the power costs are still higher, as an engineer has to be provided as well as a team to haul wood.

Tools, repairs, etc., include these items as well as all small miscellaneous expenses. The increasing cost of diamonds added materially to cost per foot in 1907.

The third table is a summary of the first two, and shows an average cost per foot for the two years of $1.705. The carats used per foot are 0.572-64, or in more intelligible decimals, .00893 carats, so that one carat on the average drilled 111.9 feet. All holes over 30 degrees dip are classed as vertical, and feet per hour in horizontal holes is about 15 per cent. greater than in vertical ones. The average depth of holes is 81.3 feet, and diameter of cores is 7-8 inch.

In comparing these costs with contractors' prices, it must be borne in mind that contractors usually require air (or steam) and water to be piped to the work, and the mine must in addition furnish the air and water free of charge. In the present cost sheets all these items are charged against costs of drilling.

COST TABLE.

Date	Labor cost	Cost per foot	Power: Kind	Power: Cost	Power: Cost per ft.	Repairs, Oils, etc.	Cost per foot	Diamonds: Carats used	Diamonds: Market price	Diamonds: Cost	Diamonds: Cost per ft.	Total Costs	Total per foot	Feet drilled	Remarks
1906															A.—"Electric power" is compressed air from electric driven compressors. Costs reckoned on assumption that diamond drill consumes as much power as a machine rock drill; that is approximately 20 H.P.
Jan.	172.00	1.012	Elec. A.	36.30	.213	22.72	.133	61/64	56.53	53.99	.318	285.01	1.676	170	
Feb. .	152.50	.798	do.	32.10	.165	7.01	036	3.47/64	"	206.70	1.082	398.31	2.081	191	
March	292.00	.734	½ do. ½ steam	112.20	.282	68.60	.172	3.35/64	60.07	213.07	.535	685.87	1.723	398	
April .	188.87	.882	Elec.	31.58	.147	26.93	.126	1.59/64	"	115.45	.539	362.83	1.694	214	
May..	480.48	1.037	do.	38.83	.083	19.41	042	5.36/64	"	334.15	.722	872.87	1.885	463	Labor contracted this month
June .															No drilling done
July..															Do. do.
Aug. .	269.25	.530	do.	52.95	.104	30.67	.060	3.25/64	60.07	203.68	.401	556.55	1.095	508	
Sept. .	52.85	.551	do.	5.07	.053	.00	.00	.46/64	"	43.17	.449	101.09	1.053	96	Drill men on vacation
Oct. .	183.60	.781	do.	51.12	.217	2.29	.009	2.19/64	61.90	141.70	.600	378.71	1.610	235	
Nov...	280.10	.681	Steam	127.42	.310	118.18	.288	2.40/46	"	160.50	.390	686.20	1.669	411	Drill operated most of Nov. and Dec. by steam direct from boiler.
Dec.. .	288.00	.911	Steam	128.32	.406	34.21	.108	4. 8/64	"	255.24	.808	705.77	2.233	316	
	2359.65	Ave. .786		615.89	Ave. .205	330.02	Ave. .109	28.56/64		1727.65	Ave. .576	5033.27	Ave. 1.676	3002	

COST TABLE.—Continued.

Date	Labor cost	Cost per foot	Power: Kind	Power: Cost	Power: Cost per ft.	Repairs, Oils, etc.	Cost per foot	Diamonds: Carats used	Diamonds: Market price	Diamonds: Cost	Diamonds: Cost per ft.	Total Costs	Total per foot	Feet drilled	Remarks
1907															
Jan.	264.25	.643	Steam	236.24	.575	13.3	.032	1. 3/64	61.90	62.89	.153	576.75	1.403	411	
Feb..	245.10	.648	Elec.	68.60	.182	5.45	.014	1.50/64	80.00	141.70	.375	460.85	1.219	378	Great advance in price of diamonds.
March	265.75	.492	do.	53.34	.099	26.23	.049	2.37/64	"	219.14	.405	564.46	1.045	540	Best month on record for low total costs.
April .	277.90	.599	do.	51.13	.110	7.3	.015	3.18/64	"	262.50	.566	598 84	1.290	464	
May .	332.00	.664	do.	58.85	.117	6.38	.013	5. 4/64	"	405.48	.810	802.71	1.604	500	
June .	397.55	.833	do. B.	175.00	.367	47.92	.100	5.16/64	71.75	376.36	.790	996.83	2.090	477	B.-Increase in power cost due to partial closing of mine throwing more costs on the power for diamond drilling.
July .	402.56	1.006	do. B.	182.25	.455	164.83	.412	7. 3/64	"	511.88	1. 79	1261.52	3.153	400	
Aug. .	439.22	.883	do. B.	200.00	.403	93.78	..189	4.44/64	"	342.77	.689	1075 77	2.164	497	June, July & August were drilling in very hard carnotite increasing diamond consumption.
	2624.33	.715		1025.41	Ave. .280	365.27	Ave. .100	30.47/64		2322.72	Ave. .633	6337.73	Ave. 1.728	3667	

SUMMARY.

PROGRESS.

Year	Feet Drilled. Vertical	Horizontal	Total	Hours. Drilling	Moving, &c.	Total	Number of Holes	Number of Shifts	Feet per Shift	Feet per Drilling Hour
1906	1523	1479	3002	1076	417	1403	45	182	13.59	2.359
1907	1573	2094	3667	1423	435	1858	37	224	16.34	2.577
	3096	3573	6669	2499	852	3351	82	406	15.285 A.	2.482 B.
	Contract feet		463							
	Feet used in calculating averages A. and B.		6206							

2 keller

COSTS.

Year	Labour		Power		Repairs, Oil, &c.			Diamonds		Totals		Feet
	Cost	Per ft.	Cost	Per ft.	Cost	Per ft.	Carats	Cost	Per ft.	Cost	Per ft.	Drilled
1906	2359.65	.786	615.89	.205	330.02	109	28.56/64	1727.65	.576	5033.21	1.676	3002
1907	2624.33	.715	1025.41	.280	365.27	100	30.47/64	2322.72	.633	6337.73	1.728	3667
	4983.98	AVE. .747	1641.30	AVE. .246	695.29	AVE. .105	59.39/64	4050.37	AVE. .607	11370.94	AVE. 1.705	6669
						Carats used per foot		0.572 / 64				

A RAPID METHOD FOR THE ESTIMATION OF ARSENIC IN ORES.*

By HARTLEY E. HOOPER, Associate.

The following method was arrived at after exhaustive trials of the usual volumetric and gravimetric processes, which were all found to be either too slow and tedious, or to require too much delicate manipulation for rapid technical work. It is suitable for sulphide or oxidized ores containing upwards of 1 per cent. of arsenic. Such ordinary constituents of the ores as lead, copper, zince, iron, manganese, or nickel do not interfere, being either precipitated as oxides or else having no reaction with the iodine thiosulphate titration.

The reactions which take place are as follows:—

$$As_2O_5 + 4KI = As_2O_3 + 2I_2 + 2H_2O$$
and $$2Na_2S_2O_3 + I_2 = 2NaI + Na_2 2S_2O_3$$

The solutions required as:—

$Na_2S_2O_3 5H_2O$ 33.1 grm. per litre
then 1cc. = 0.005 grm. of arsenic.

Sodium hydrate 25 per cent. solution.

The sodium thiosulphate may be standardized either against copper or arsenious oxide.

Copper.—Take 0.3 grm. of copper, dissolve in 10 cc. dilute nitric acid, boil off nitric fumes, add ammonium hydrate till jus talkaline, boil off the excess of ammonia and then add 1 cc. of glacial acetic acid, cool, add potassium iodide and titrate with sodium thiosulphate. Then the copper value multiplied by 75 and divided by 127.2 gives the arsenic value of the solution.

Arensious Oxide.—Take 0.264 grm. of pure arsenious oxide, add 5 cc. of concentrated nitric acid, evaporate to dryness and heat strongly for a few minutes, take up 25 cc. with sodium hydrate solution, warm and then make up the bulk of the solution to 50 cc., neutralize with concentrated hydrochloric acid and then add 25 cc. in excess, cool, add potassium iodide and titrate until the solution becomes perfectly colorless. Test the solution with starch, and if it shows any deep blue coloration the standard must be repeated.

Treatment of Ore.—For ores containing about 20 per cent. of arsenic take 0.5 grm., place in a 12 ounce tumbler beaker and add 10 to 15 cc. of a moderately strong solution of potassium chlorate in concentrated nitric acid, evaporate gently to complete dryness and allow to heat for a few minutes to get rid of all oxidizing matter. Cool, add 10 cc. dilute ammonium hydrate, bring to boiling to disintegrate the mass and then add 25 cc. of the sodium hydrate solution; boil again and filter hot, and wash with hot water. The filtrate should not exceed 50 cc.—if it does, evaporate down to about 50 cc.; neutralize with concentrated hydrochloric acid and treat as in standard.

Notes on the Method.—The proportion of hydrochloric acid to the bulk of the assay should be about one-half or three-fifths; if less acid be present a reverse reaction sets in, the arsenious oxide being oxidized to arsenic oxide, shown by the color going and coming during the titration. If too much hydrochloric acid be present the potassium iodide will not dissolve and the sodium thiosulphate is decomposed and sulphur is precipitated, disguising the finish. The titration should be done slowly, especially towards the finish, and if the yellow color returns a few drops of thiosulphate will discharge it, and the higher reading should be taken.

The starch indicator is of no use in the titration, but may be used to confirm the finish. In the strong hydrochloric acid solution the thiosulphate will not discharge the starch color. For exact work it is advisable to take a blank assay of water and hydrochloric acid in the right proportions, add potassium iodide and titrate. This is to allow for any free chlorine being present in the acid.

If antimony be present, instead of dissolving the ore in nitric acid it should be fused with sodium peroxide in a nickel crucible, the alkaline water extract being treated as before.

The following experiments were performed to test the accuracy of the method:—

The Use of Stach Gave the Following Results.—50 cc. of water plus 30 cc. hydrochloric acid plus potassium iodide took 0.1 cc. of standard thiosulphate, giving an instant finish, and, on the addition of starch, no color. Similar amounts using starch required from 0.5 cc. to 1 c.c. and then would show no definite finish.

Effect of Varying Hydrochloric Acid.—A solution of sodium arsenate in water containing the equivalent of 0.1 grm. of arsenic in 50 cc. was in each case.

	Arsenic solution.	Hydrochloric acid.	Thiosulphate required.
1.	50 cc.	10 cc.	22.1 cc.
2.	50 cc.	25 cc.	22.2 cc.
3.	50 cc.	30 cc.	22.2 cc.
4.	50 cc.	50 cc.	about 22.0 cc.

In (1) the color went and came during the titration.

In (2) the finish was fairly sharp, but the starch gave a color on standing.

In (3) the finish was sharp, and the starch gave no color on standing.

In (4) the potassium iodide did not dissolve until well on with the titration, and towards the end the thiosulphate was decomposed, precipitating the sulphur and disguising the finish.

*A paper read before the Institution of Mining and Metallurgy.

Effect of Varying Sodium Chlodide:—

	Arsenic. solution.	Hydrchloric acid.	Sodium chloride.	Titration.
1.	50 cc	30 cc.	2.5 grm.	22.1 cc.
2.	50 cc.	30 cc.	5 grm.	22.2 cc.
3.	50 cc.	30 cc.	10 grm.	22.15 cc.
4.	50 cc.	30 cc.	20 grm.	22.2 cc.

In (3) the sodium chloride only dissolved during the titration, and in (4) a considerable portion was left undissolved, rather disguising the finish.

Effect of Potassium Chlorate.—A blank assay was done using 15 cc. of the nitric acid potassium chlorate solution and evaporating to dryness. The titration required only 0.1 cc. of standard thiosulphate.

The Moose Mountain Iron Range, with Special Reference to the Properties of Moose Mountain, Limited.*

BY NORMAN L. LEACH, Sudbury, Ontario.

(Ottawa Meeting, March, 1908.)

The conformation of the Moose Mountain Iron Range has been traced in a general manner and found to extend in a northwesterly direction from the northwest shore of Lake Wahnapitae, in the district of Nipissing, to Onaping Lake, in the district of Algoma, a distance of approximately thirty-five miles.

Twenty-five miles due north of Sudbury, in the twonship of Hutton, are situated the properties of the Moose Mountain, Limited. The existence of iron ore in this township has been known in a general way for years. During the gold excitement of the "nineties," prospectors travelling the West Branch of the Vermilion River, in search of the yellow metal, portaged across a ridge of the "No. 2" deposit at a point known as the "Iron Dam," the wearing away of the moss on the portage having exposed the ore in several places.

In 1901 and 1902 Sudbury prospectors, though Mr. Chase S. Osborne, of Sault Ste. Marie, Michigan, succeeded in interesting Mr. John W. Gates, of New York, and associates, in the property. Enough exploratory work was then done to prove its value and negotiations commenced with the object of securing rail connections with the Georgian Bay.

Messrs. Mackenzie & Mann, appreciating the possibilities of the ore tonnage as a source of revenue for their railroads, became interested in the property, and as a result a branch of their Canadian Northern Ontario Railway, from Toronto to Sudbury, has been built from Sudbury North to the mines, a distance of 35 miles. A six mile spur from the main line, a few miles south of the French River, has been constructed to the Georgian Bay at a point known as Key Inlet, and is the final link connecting the mines with the Great Lakes, making a rail haul for the ore of about eighty miles, or about the same average haul of the three iron-ore-carrying roads of Minnesota.

Ore docks for the transhipment of the ore are now under construction by the Mackenzie & Mann interests at the "Key." A splendid natural harbor has been secured there with twenty-four feet of water alongside the ore docks, more than enough to float the largest vessels on the Great Lakes; and the "Key" as a shipping point by water is 500 miles nearer any of the iron ore receiving ports, as compared with shipments from the head of Lake Superior. This will be a considerable factor in the securing of favorable lake freight rates.

The docks are of unique construction, and will be unlike any on the Great Lakes for the handling of iron ore. The ore from the mines, loaded in hopper-bottomed cars, is dumped from a trestle to a stock pile ground beneath. Under this stock pile ground, in line with the centre line of the trestle, is a tunnel through which a forty-two inch belt will convey the ore to a similar belt at the water's edge, which in turn conveys and elevates the ore to the dock trestle, sixty feet above the water level. It is then tripped off the belt, weighed by an automatic device, and dumps into pockets from which it will be spouted into the hold of the vessels alongside the dock. It is expected that these belts will have a capacity of eight hundred tons of ore per hour.

Development work at the properties of the Moose Mountain, Limited, has proven the existance of several large deposits of merchantable ore, principally magnetite, and a small amount of hematite. The ores occur in the following rocks of the Keewatin age. Those in close proximity to the ore bodies consist principally of diorite, diabase, hornblende-schist, hornblende-gneiss, all of which may be collectively referred to as greenstone. In a few instances granite comes into contact with the ores. Numerous exposures of magnetic ores are to be found. Where weathered the ore presents grey, dark green and black appearances, and for shipment the ores have a steel grey appearance. These ores can be delivered to any blast furnaces in Canada or the United States, tributary to the Great Lakes, and the product from the Moose Mountain mines will be disposed of in the above markets.

The present guaranteed analysis on ore sales is:—

Iron	55. 50
Phosphorus	.10
Silica	13. 29
Manganese	. 02
Alumina	1. 21
Lime	3. 60
Magnesia	3. 15
Sulphur	.011
Titanium	none
Moisture	1. 00

So far actual mining operations have been confined to "No. 1," or original "Moose Mountain" deposit. The surface of the ore body at this point is approximately 140 feet above the level of the railroad loading tracks. The ore is won by overhand stoping, from an open face of from 60 to 70 feet in height, trammed out to a large chute discharging thirty feet below the level

*Journal of the Canadian Mining Institue. Part of Vol XI.

of the bottom of the present stope into a No. 8 Austin gyratory crusher, which reduces it to a maximum size of five to six inches diameter. Leaving the number eight crusher the ore passes through a revolving screen 48 inches by 12 feet with 1-4 inch perforations, the rejections going direct to the foot of the elevator pit, and the balance to a No. 5 Austin gyratory crusher discharging into a 14-inch by 30-inch buckets of a fifty-two foot centre belt elevator, which elevates the ore into the loading bins, whence it discharges through hoppers into the railroad cars.

A 16-inch by 42-inch Jenckes Corliss engine, to drive the crushing plant, and two 150 h.p. return tubular boilers, constitute the present power plant, the machine drills having been operated by steam up to the present time.

Very little systematic exploration work has been done upon the Moose Mountain Range as yet, and when it is remembered that upon all of the older ranges of the Lake Superior country millions of dollars have been, and are still being, spent in the systematic search for new ore bodies—and that all these iron ranges show more ore in sight to-day than they ever did—it seems a reasonable possibility that careful explorations in the future will reveal still other bodies of high grade merchantable ore in the Moose Mountain District.

THE IRON ORES OF ONTARIO.*

By A. B. Willmott, Sault Ste. Marie, Ont.

(Ottawa Meeting, 1908.)

This article, like many of its predecessors, must be a record of what we are going to do in the development of the iron ore resources of Ontario, rather than of what we have accomplished. It will be a statement of the opportunities open for the iron-ore miner, rather than a statement of results attained. The production of iron ore in Ontario has been as follows:—

	Tons.	Value.
1869-1896	582,542	$1,445,225
1897	2,770	4,996
1898	27,409	48,875
1899	16,911	30,951
1900	90,302	111,805
1901	273,538	174,428
1902	359,288	518,445
1903	208,154	450,099
1904	53,253	108,068
1905	211,597	227,909
1906	128,049	301,032
1907	160,000?	350,000?
	2,113,813?	$3,771,835?

Character of Ores.

Hematite.—We have in Ontario all the usual varieties of merchantable iron ore. Of the total production by far the larger amount, namely, about one and a half million tons has been of hematite ore. So far as this has come from the Helen mine there has been mixed with the pure hematite a certain amount of limonite and goethite, which would make the product of that mine strictly classed as brown hematite. An average analysis of 20,000 tons of the earliest shipments from the Helen, runs as follows:—

	Per cent.
Moisture at 212 degrees F.	6.610
Iron	58. 70
Silica	5.660
Alumina	0.730
Lime (CaO)	0.210
Magnesia (MgO)	trace
Phosphorus	0.114
Sulphur	0.047
Organic matter & combined water	9.670
Insoluble	6.040

The average cargo analysis for 1901 was 58.709 per cent. iron, and for 1907 just a shade better, showing that this property has maintained its grade as depth has been attained. Ores similar to the Helen have been discovered and explored at several other points, as Steep Rock, Frances, and Josephine, but as yet there has been no production. From a number of properties in Eastern Ontario, of which the Wallbridge, Dalhousie and McNab are the chief, about 150,000 tons of hematite have been produced. These ores have been good in their iron, phosphorous and sulphur contents, and carried small percentages of lime which was an additional advantage. All these eastern deposits have so far proved small, and there is reason for believing that some of them, if not all, are oxidized portions of iron pyrites beds lying below. From the Stobie mine, in Aberdeen township, a few small cargoes of specular hematite of good quality were shipped some years ago. Similar specular hematites occur in the quartzites of the Lower Huronian, at a number of points, as at Killarney, Algoma Mills, and around Echo Lake. In Aberdeen township a vein of high grade hematite occurs at the contact of a quartzite and slate conglomerate, and has been traced by pits at intervals for over a mile.

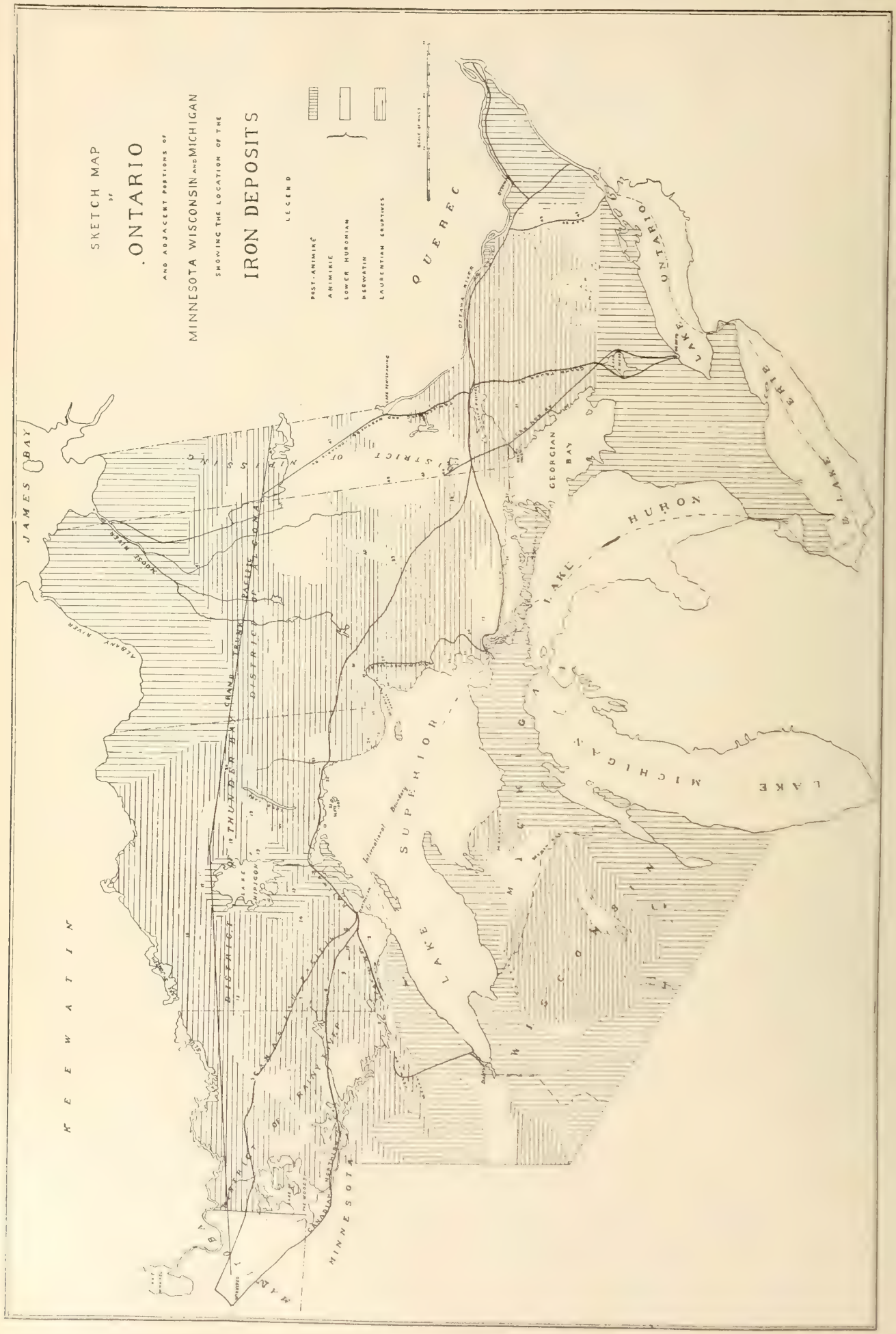
Analysis shows as, as follows:—

	Per cent.
Iron	65. 60
Manganese	. 10
Silica	1. 73
Alumina	1. 31
Lime	. 39
Magnesia	trace
Phosphorus	0.045
Sulphur	.005

A somewhat slaty hematite occurs on the Williams property a few miles north of Sault Ste. Marie, Ont. A silicious hematite, but otherwise of excellent quality, occurs in the flat lying Upper Huronian, at Loon Lake, east of Port Arthur.

Magnetite.—Of the total production of the province about 600,000 tons have been of magnetite. For the most part these ores have been high in iron, low in phos-

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SKETCH MAP
OF
ONTARIO
AND ADJACENT PORTIONS OF
MINNESOTA WISCONSIN AND MICHIGAN
SHOWING THE LOCATION OF THE
IRON DEPOSITS
LEGEND
POST-ANIMIKIE
ANIMIKIE
LOWER HURONIAN
KEEWATIN
LAURENTIAN ERUPTIVES
JAMES BAY
QUEBEC
ONTARIO
LAKE ERIE
GEORGIAN BAY
LAKE HURON
LAKE MICHIGAN
LAKE SUPERIOR
KEEWATIN
MINNESOTA
ALBANY RIVER
SEVERN
SEOUX
DISTRICT OF THUNDER BAY
DISTRICT OF ALGOMA
GRAND TRUNK PACIFIC
RAINY LAKE
NIPIGON
NIPIGON BASIN
NIPIGON RIVER
DISTRICT
Nickel Range
Nickel Range
Nickel Range

phorus, high in sulphur, and with titanium absent. The average of ten samples of Belmont ore taken by Prof. Miller, runs:—

	Per cent.
Iron	60. 02
Phosphorus	.015

A shipment of 800 tons from the same mine averaged:—

	Per cent.
Iron	57.38
Phosphorus	.01
Sulphur	.08

A shipment of 8,514 tons of Farnum ore ran, iron, 54.05; phosphorus, .018 and sulphur, .059; titanium, nil. A pile of 7,000 tons of ore from the Wilbur Mine averaged 57 per cent. iron, and under .01 phosphorus. Thirty-seven determinations for phosphorus made by Ingall on magnetites from the vicinity of the Kingston and Pembroke Railway ran from a trace to .17, averaging .022.

From the northern part of the province magnetites have been mined this past year, and will be shipped in an increasing amount next year. Atikokan ore from mining locations E. 10 and 11, has been smelted this season in the furnace of the Atikokan Iron Company, at Port Arthur. Surface samples from this property run, iron, 66.5; silica, 3.2; phosphorus, .015 and sulphur, .01, according to sampling and analysis by Hille[1]. An average of seven samples of the best ore from a number of diamond drill cores is given by Hille, as iron, 59.3; phosphorus, .069; sulphur, 1.09, and this probably fairly represents the ore when below the zone of oxidation. The ore is being roasted by blast furnace gas before being smelted, and is giving excellent results in the manufacture of foundry pig.

A property a short distance to the west has been explored this past year by the United States Steel Corporation, and purchased by them. Surface samples show magnetite running from 53 per cent. to 67 per cent. in iron, .007 to .058 in phosphorus, and .07 to .5 in sulphur.

Another property which will this year begin shipping magnetite is the Moose Mountain, lying north of Sudbury, of which the guaranteed analysis is, iron, 55.0; phosphorus, .10; and sulphur, .011.

TITANIFEROUS MAGNETITE.—There are throughout Ontario a number of considerable ore bodies of titaniferous magnetite, such as the old Chaffey mine, and the Matthews mine, on the Rideau Canal, from which several thousand tons were shipped years ago. Near Gooderham, Ont., is a similar deposit, in connection with a large gabbro intrusive. Near Chapleau, Ont., a magnetite deposit carries 10 per cent. titanium. The Orton mine in Hastings county, an undeveloped prospect, carries from 1 per cent. to 3 per cent. titanium. In twenty-five samples of magnetites taken by Ingalls along the Kingston and Pembroke Railway, titanium was absent in 13, and 12 went between 1.03 per cent. and 16.45 per cent. Numerous other occurrences are known, but in practically every case titanium is absent from the magnetites and hematites of Ontario, except where the deposit is connected with basic eruptives.

LIMONITE.—Bog ore occurs at many points throughout the province, as deposits resulting from the leaching of the glacial drift. There are also numerous deposits resulting from the weathering of iron pyrites, and some from the weathering of iron carbonate.

Back as far as 1813 small quantities of bog ore from Norfolk county were smelted in a small furnace at Normandale. In more recent years bog ores from Oxford county and vicinity have been smelted in small quantity at Hamilton. As already mentioned a percentage of limonite is mixed with the Helen ore, which has been classed as a hematite. Bog ores resulting from the oxidation of pyrites occur at Paint Lake in western Michipicoten, Goudreau Lake, near Missanabie, and in the vicinity of the Josephine. Similar ore is seen near some pyrites deposits near Steep Rock Lake, and also in Parkin township, north of Sudbury. Eleven cars of limonit, from what afterwards became the Bannockburn Pyrites mine, were smelted at Hamilton. The better class of such ores run from 50 per cent. to 55 per cent. in iron, and under; .5 per cent. in sulphur. On the Mattagami River, there is a limonite deposit resulting from the oxidation of iron carbonate occuring in the Devonian limestone. This ore runs from 48 per cent. to 57 per cent. in iron, about .1 in sulphur, and from .1 to .2 per cent. in phosphorus. Smilar ore is found at a number of points in the valley of the Moose River, and its branches, originating in a similar way.

SIDERITE.—In connection with a number of hematite deposits in Ontario, quantities of siderite are found, which may yet become of commercial value. On the hill back of the Helen mine, there are exposed siderite lenses aggregating a width of 136 feet, and averaging 34.94 per cent. in iron, and 7.7 per cent. insoluble. A picked specimen yielded:—

	Per cent.
Insoluble	4.38
Carbonate of iron	78.57
Carbonate of lime	4.09
Carbonate of magnesia	12.84
Alumina	trace
Total	99.88
Metallic iron	37.71

Ore of this character in considerable amount is found at the Josephine, at Steep Rock Lake, and at other points throughout the privince. It is almost always contaminated with sulphur up to 1 per cent. or 2 per cent., and but for this might be considered a fair ore of iron. It is low in phosphorus, and on roasting would yield a product running 50 per cent. in iron, and the roasting would eliminate the sulphur. The magnesia and lime present would serve as useful fluxes.

In the vicinity of Port Arthur in the Animikie formation are considerable bands of siderite, somewhat lower in iron content, and correspondingly higher in silica. The bands correspond to the taconite of the Mesabi range, though they are higher in carbonate of iron. One deposite north of Port Arthur is said to be 500 feet long by 100 feet wide, by 12 feet deep, and to average 33 per cent. iron. On the Opazatika River, and on other tributaries of the Moose, iron bearing limestones are found. These carbonates are probably too low in iron ever to be of direct value as an iron ore; possibly, however, bodies of hematite may yet be found in their vicinity.

MAGNETIC SANDS.—At many points in the province iron sands are being, or have been, concentrated by the waters of the Great Lakes. Such a deposit is found in the vicinity of Peninsula Harbor, on the north shore

of Lake Superior. On the north shore of Lake Erie a small amount of such sands was smelted in the furnace at Normandale nearly 100 years ago. It is improbable that these sands can be made of commercial value at the present time.

Geological Classification of Ores.

The geological formations occurring in Ontario, beginning at the most recent, are as follows:—

Cenozoic	Pleistocene
Paleozoic	Devonian Upper Silurian Lower Silurian Cambrian
Pre-Cambrian or Archean	Keweenawan or Nipigon Animikie or Upper Huronion Middle Huronian Lower Huronian (Laurentian Eruptives) Keewatin

In this classifiaction the recommendations of the International Committee on the succession in Lake Superior region have been followed.[3] The Laurentian granites, etc., which used to be considered the base of the geological column are now recognized as eruptives, always later than the Keewatin, and very frequently later than the Middle Huronian. In the Eastern section of the province, the International Committee recommended the following succession from below, Laurentian, Grenville, but Miller has shown (bur. of Mines, Vol. 16, page 221) that rocks undoubtedly Keewatin occur in that section of the province, and that the Grenville is really an upper portion of the Keewatin. Miller further finds an overlying formation carrying pebbles of the Grenville, which he considers Huronian. His classification corresponds closely with that adopted for the Lake Superior region, and permits an orderly arrangement of many facts, which did not fit with the previous classification.

In the Pleistocene we have the insignificant deposits of bog iron. In the Devonian there are some siderite deposits now altering to limonite in the valley of the Moose River, which are as yet unknown, and so far of no commercial value. The Clinton formation of the Upper Silurian is in Ontario, commercially barren, although a small deposit has been found near Cabot Head. The base of the Medina of the Upper Silurian is marked by red ocherous clays, which are, however, of no value. At the base of the Potsdam of the Cambrian, there are some deposits of impure hematite, such as that at Dog Lake, north of Kingston. At the base of the Keweenawan again, there are some ocherous clays, which in places almost approach iron ores, but are so far of no commercial value. In the Animikie there are possibilities of commercial ores. This formation is the one which on the United States side of Lake Superior carries the Mesabi, Gogebic and Menominee iron range. It is found in Ontario in the triangular area between the Port Arthur, Duluth and Western Railway, Lake Superior and the American boundary. At numerous points in this area indications of ore have been found, and large ore bodies have been developed at Loon Lake. In the vicinity of Sudbury is another Animikie area, but so far as known carrying no iron deposits. Except these two areas, and a few other very small areas the Animikie is unknown in Ontario. North of the province on the eastern shores of James Bay, rocks apparently of the Animikie series are found on the Nastapoka Islands. Here very considerable bodies of iron ore have been found, and when transportation difficulties are removed these ores will undoubtedly come on the market.

The Lower Huronian formation is widely distributed throughout Ontario, the typical region being that north of Lake Huron. It should be noted that all the older geological maps and reports by Canadian Geologists. use the term Upper Huronian for what is now called Lower Huronian, and similarly Lower Huronian was used in the older reports for what is now termed Keewatin. On the accompanying map the areas of Keewatin and Lower Huronian are outlined with as great accuracy as our present knowledge of the unsettled regions of Ontario will permit. It has not proved possible to show them separately on a small scale map even when the information was at hand to do so. So far little iron ore of commercial value has been found in the Lower Huronian areas. In Deroche township north of Sault Ste. Marie, some prospecting has been done with fair results. In Long and Rutherford townships, deposits of specular hematite have been found in small quantities. In Aberdeen township a more promising prospect occurs. All of these deposits are associated with quartzite or slate. The banded jasper and hematite of the Marquette range is for the most part absent in the typical Lower Huronian area. In Harrow township the typical iron formation does, however, occur in the Lower Huronian, and at two other points iron carbonate has been found.

In the Keewatin the most promising iron deposits of Ontario are found. This formation is very widely distributed and in practically every place where Keewatin or Huronian are marked on the various geological maps, bands of sedimentary iron formation can be found. These may be small in extent, representing only the last remnants of a large area, or they may be long and narrow belts. Usually the bands are only a few hundred feet wide; almost always less than half a mile. Most frequently there are a series of lenses ranged in a row or occasionaly in a few parellel rows. At times the iron belt extends for many miles enclosed on either side by green schists. The Nipigon-Long Lake belt is almost continuous for 70 miles.

The ores associated with the basic intrusives may occur in different periods, but seem to be all pre-Cambrian.

The iron ranges on the American side of Lake Superior show a close similarity geologically to those in Ontario. As seen on the map the various producing ranges occur in Keewatin, Huronian and Animikie series of the Archean. These formations occur as narrow belts between the eruptive granites, just as in Ontario. The characteristic association of banded jasper with ore is true on both sides of the lake. In the following table the total production of the different ranges is given.

Range.	Year opened.	Total tons.	Shipments per cent.
Marquette	1885	84,846,280	22.3
Menominee	1877	63,806,652	16.7
Gogebic	1884	54,023,478	14.2
Vermilion	1884	26,785,950	7.0
Mesabi	1892	150,198,054	39.4
Ontario	1900	1,361,000†	.4
		381,024,414	100.0

The Ontario production is made up mainly of shipments from the Helen mine on the Michipicoten range, and the McKellar property on the Atikokan. Both of these properties are in the Keewatin formation, as also are the mines in the Vermilion. The mines of the Menominee, Gogebic and Mesabi are all in the Animikie, and most of the Marquette production comes from the Lower Huronian, although a portion of it is at the base of the Animikie, practically at the contact with the Lower Huronian. Assuming that the whole of the Marquette jroduction is from the Lower Huronian, one finds that of the total production of iron ore from around Lake Superior, 70.3 per cent. has been produced from the Animikie, 22.3 from the Lower Huronian, and 7.4 from the Keewatin.

Comparison With Scandinavian Ores.

In the transactions of the American Institue, 1907, a classification of the Scandinavian Iron Ores is given by Prof. Sjorgen. Considering the similarity between the general geological conditions of Scandinavia and northern Ontario, a comparison is of interest.

1. Ores of the Archean Crystalline Schists.
   - A. Apatite Ores.
   - B. Mixed Hematite and Magnetite.
   - C. Quartz Banded Ores.
   - D. Skarn Ores.
   - E. Limestone Ores.
2. Ores of the Porphyries.
3. Magmatic Segregations in Basic Eruptives.
4. Iron Ores of Metamorphosed Cambro-Silurian Schists.
5. Contact Deposits in the Christiana Region.
6. Lake and Bog Ores.

Of these groups numbers 2, 4 and 5 are not found in Ontario. While eruptive porphyries occur, so far we have no iron ores associatel with them. In Ontario there are no metamorphosed Cambro-Silurian Schists, nor eruptives of the post-Silurian age, so that groups 4 and 5 are impossible. The other groups 1, 3 and 6 are found in Ontario, and closely resemble the corresponding deposits in Scandinavia. The Apatite ores of group 1, resemble closely the ore mined in the Lake Champlain region of New York State, which again is closely paralleled by some deposits in eastern Ontario. The mixed hematite and magnetite deposits free from banded material are not common in Ontario, but the deposit north of Cartier would seem to resemble corresponding deposits in Scandinavia. The quartz banded ores are extremely common in Ontario, more so than in Scandinavia. Typical occurrences are those of the Mattawin, Michipicoten and Temagami ranges. The Skarn ores and Limestone ores of group D. and E. can be paralleled from some of the minor deposits in eastern Ontario. Magmatic segregations in basic eruptive rocks, group 3, are very common in Ontario, and titaniferous as in Scandinavia. The lake and bog ores of the two countries are naturally similar.

Genesis of Iron Ores.

As previously stated the majority of the Ontario ores occur in the Keewatin formation. At the base of this series is a mass of greenstone frequently ellipsoidally parted, which is the oldest known rock of the Lake Superior area. Overlying this are various green schists, and towards the top of the series the iron formation proper. This consists of ferruginous cherts more or less banded with hematite and magnetite, iron carbonate and iron pyrites. Carbonated schists frequently border the iron formation. Originally these belts seem to have been a chemical sediment, but are now found in nearly every case closely folded, and standing nearly vertical. Transverse folding has been a very common occurrence, and the anticlines have been frequently eroded until the formation has been cut off into separate lenses, varying from a few feet to a few miles in length. In most cases the width of the formation is a few hundred feet, and occasionally up to half a mile. Folded with the iron formation there is usually a bed of green schists which forms an impervious layer at the bottom of the basin. The American geologists who have closely studied the Vermilion and other south shore ranges are of the opinion that the ores associated with these ranges have resulted from decending water concentrating the leaner ores from above, in the bottoms of these basins. Iron carbonate is supposed to have been the most frequent source of the ore, but both iron silicate and iron pyrites have also contributed. Probably in our Ontrio ranges iron pyrites is a larger contributer than in the ranges to the south, as it occurs much more frequently in the ranges to the north of Superior than to the south. In some few cases the original deposits in connection with the formation seems to have been rich enough to make an iron ore without further concentration. In other cases there are lean silicious magnetites up to 40 and 45 per cent., which can hardly be classed as commercial ore bodies, and which might well represent original deposits without secondary concentration. In these the silicious bands are absent, the silica being more evenly distributed through the whole mass. Another class of ore bodies includes those which are regularly banded, consisting of either hematite or magnetite, alternating in narrow bands from 1-8 inch to 2 inches in width, with bands of quartz, which may be white chert, or red or black jasper. It is with the more granular cherts that the hematite ore bodies so far discovered have been found.

Special Descriptions.

An attempt has been made to show on the map the principal areas in which iron ores have been found, and to add here a very brief description concerning them. It is probable that in every area shown on the map as containing Keewatin rocks, the iron formation will be found when search is made. In the following descriptions the numbers after the names refer to the corresponding numbers on the map.

The Dryden and Wabigoon area (1) shows a number of bands of lean silicious magnetite with assays running in the vicinity of 40 per cent. iron. Kaiarskons Lake deposits (2) of silicious magnetite with some higher grade lenses have been slightly explored. Parallel to it is a belt of iron pyrite characteristic of the Keewatin ranges. At Bending Lake (3) a number of locations have been taken up on a silicious magnetite somewhat similar to the two previous ones. In Watten and Halkirk townships on Rainy Lake (4) a band of the iron formation has been found, containing magnetite and particularly rich in sulphides. It is traceable at intervals for some miles either way, and is really part of one belt extending from Fort Frances up the valleys of the Seine and Atikokan as far as Magnetic Lake, a distance of slightly over 100 miles. At Steep Rock Lake (5) the formation has been considerably bent. Diamond drilling on the eastern arm

of Steep Rock Lake, and also on Strawhat Lake has disclosed fair bodies of hematite ore. In these cases, as in several others in Ontario, bodies of iron pyrites are found in close contact with, but not contaminating, the hematite ore. Considerable bodies of siderite also occur. Through the valley of the Atikokan (6) are a number of deposits of magnetite standing out as low hills in the valley, and accompanied by various green schists. These magnetites are low in phosphorus, but high in sulphur. The deposit of McKellar's is now being worked by the Atikokan Furnace Company, and a property a short distance west of this, after careful exploration, has been bought the past year by the United States Steel Corporation. On Fire Steel River (7) bands of pyrites are known, which represent the iron formation in that belt of Keewatin. On Hunters Island (8) there are several parallel belts of the iron formation which may represent a folding of the Keewatin, but possibly as suggested by Leith some of the belts are Huronian. The Hunters Island range is in line with the Vermilion, and distant from the closest part of it about 20 miles. There has been little exploration beyond surface work, but it is reported that the little drilling done was fairly successful. At Greenwater Lake (9) is a continuation of the Vermilion-Hunters Island belt, and this continues to the east through the Mattawin area (10) and Conme and Ware townships (11). These last three occurrences are all similar in character, showing banded jaspers with magnetite and hematite. Picked samples from the surface of locations on the Mattawin, yielded 58 per cent. to 68 per cent., iron, .013 to .056; phosphorus, .054 to .164; sulphur and titanium, nil. The amount of ore in this belt is very considerable, but so far the limited exploration which has been done has not revealed any large concentrations. The ore is favorably situated for transportation, and could be quarried from hillsides. Until, however, the higher grade ores are mined out, it is questionable whether these surface deposits running 40 per cent. in iron can be economically concentrated. There is, however, a probability that bodies naturally concentrated may be found, if properly sought. The Animikie formation (12) occupies a considerable area round Lake Superior, and at many points within it carbonate of iron, running 20 per cent. to 25 per cent. is found.

At Loon Lake and vicinity, 25 miles east of Port Arthur, considerable exploration work has been done, resulting in the finding of several beds of excellent hematite ore, narrow, however, in width, and separated from each other by lean material. This ore where pure is high in iron and low in phosphorus and sulphur, and carrying a little lime, is altogether an excellent furnace ore. The costs of mining and concentration are, however, problematical, and no company has yet attempted to operate commercially. Altogether there is a big tonnage of ore which will undoubtedly be valuable before long. It is only four miles from Lake Superior, and is traversed by the main line of the Canadian Pacific Railway. A second series of beds lie above those already mentioned, which contain even larger quantities of iron. This is, however, only about 35 per cent. ore, and high in phosphorus and sulphur. On Black Sturgeon River (13) are some deposits of hematite in the Keewatin of a promising character. At Little Pike Lake (14) specular hematite interbanded with a gray slate occurs on a number of locations taken up some years ago, but on which no work has been done. At Savant Lake (15) the usual iron range rocks of the Keewatin occur, and search may result in the finding of merchantable ore. On Whitearth Lake (16) iron range rocks are reported. At Cariboo Lake (17) lean silicious magnetite is found over a large area, also at Mud River, somewhat to the east. In the valley of the Red Paint (18) the Keewatin formation is traceable for some miles, and some diamond drilling was in progress last year. The Nipingon-Long Lake (19) belt is 70 miles long and almost continuous. At the Nipigon end three parallel belts are found, the centre hematite, and the north and south magnetite. A little drilling has been done but not enough to determine definitely. At Little Pine Lake (20) a similar formation occurs, and also on the Slate Islands (21). On Lake Superior at the mouth of the Little Pic (22), locations were taken up years ago for a magnetite associated with a basic eruptive. The ore is lean and probably useless. Ten miles up the Pic River (23) are some magnetite locations showing iron ore carrying about 45 per cent. and contaminated with a little sulphur. At Otter Cove (24), in a small fragment of the Keewatin, a lean magnetite occurs. At many points throughout the Keewatin belt of the western part of Michipicoten (25) the usual iron range rocks are found. Towards Lake Superior these occurrences are silicious magnetites; further north they are banded cherts with hematite and magnetite. At the Frances diamond drilling has shown towards the bottom of one of these basins, considerable hematite of good quality. In central Michipicoten we have characteristic banded cherts and hematite at a number of points. At the Helen Mine (26) is the largest ore body yet exploited in the province, which has yielded about one and a third million tons of ore to the end of 1907. Associated with this ore, as is so often the case, are deposits of pure pyrites. At the Josephine (27) drilling has shown considerable ore, under the waters of Parks Lake. The iron range is traceable both east and west from the lake, and theory indicated that where the iron-bearing rocks had been broken down and eroded so as to form a lake basin, a deposit of ore might be sought, and this was done successfully. Further to the north (28) the range is so rich in sulphur that it has become of value as a source of iron pyrites, iron oxide except as a gossan being practically absent. At Michipicoten south, lean magnetites are found at several points as at Anjigomi (29) and Bridget Lake (30). At Cape Choye (31) and eastward, an unimportant belt of Keewatin occurs, carrying lean hematite and magnetite. At Batchawana (32) banded jasper and hematite occur a few miles from Lake Superior, and six miles further back several deposits of lean magnetite. At Goulais Bay (33) a belt of the Keewatin formation runs east and west for several miles, and is enclosed by rocks of the Lower Huronian. The brilliant jasper conglomerates which occupy miles of the Lower Huronian have always proved extremely interesting, and until the discovery of this Goulais belt no source of the jasper pebbles was apparent. The probability is that this is only a small part of one of several buried ranges. In Deroche and ajoining townships there are several occurrences of hematite associated with quartzite and slate. Some of these lenses are good ore, but no large bodies have yet been found, though further development is warranted. From Aberdeen township (35) several small vessel-loads of good hematite were shipped years ago. In the northern part of the township a promising prospect of hematite is being developed, which occurs at the contact of the slate and quartzite. In the townships of Long (36) and Rutherford (37) occurrences of high grade specular hematite in the quartzite have been explored, but the deposits have proved small. North of Cartier (38) a deposit of hematite and magnetite is of considerable

promise. At Woman River (39) and north of Flying Post (40) belts of banded jasper and hematite are found continuous for some distance, and of considerable width. At the Grand Falls on the Mattagami (41) carbonate of iron and the resulting limonite are found. Further exploration of these and similar deposits occurring in the Devonian may show ores of value as soon as transportation has been provided. At Shining Tree Lake (42) and Burwash Lake (43) the usual banded ores are found. At Moose Mountain (44) is a large deposit of magnetite, which seems to be an original deposit, and not a secondary concentration from the usual leaner ores. This property is now connected with the Georgian Bay at Key Inlet by railway, and shipments will begin on a large scale next season. To the north and west banded iron continues, and is found on the Wahnapitae (45) to the southeast. Around Temagami Lake (46) are several belts of the usual iron range rocks making altogether a good many miles in length. On the Caldwell-Mulock property a little diamond drilling has been done, but with this exception these ranges are as yet unexplored. In Boston township (47) lean magnetite has been found, and a little exploration work has so far failed to locate commercial ore bodies. At Lake Abitibi (48) the usual iron range rocks occur. Along the Kingston and Pembroke Railway in Eastern Ontario are numerous deposits of magnetite which have been worked in a small way in years gone by.

Similar occurrences are found in Hastings and adjoining counties (50). In both these districts the magnetites are fairly high in iron, low in phosprus, and apt to be contaminated with sulphur. In the Parry Sound district (51) there are several occurrences of magnetite, associated with limestone. This area has not yet been mapped, so that an outline of the Keewatin and Huronian cannot be given.

Conclusions.

There is no other area in the world equal to the Lake Superior region as a producer of high grade iron ore. The only competitor is the Minette region of Germany, France and Belgium, which is being rapidly left behind. The following table shows the great increase in production which has yearly taken place on the American side of Lake Superior:

Production of Iron Ore from Lake Superior.

	Long tons.
1891	7,621,465
1892	9,564,388
1893	6,954,620
1894	7,682,548
1895	10,268,978
1896	10,566,359
1897	12,205,522
1898	13,779,308
1899	17,802,955
1900	19,121,393
1901	20,593,537
1902	27,571,121
1903	24,281,575
1904	21,726,590
1905	34,241,598
1906	38,393,495
1907	41,817,385

But even the immense resources of the American side of Lake Superior will reach an end. The serious drain on this supply is well known in the following quotation from Van Hise, one of the best authorities on Lake Superior iron mines.

"The total produce of the Lake Superior region since mining began in 1850 to 1899, inclusive, is 171,418,984 long tons. The amount mined in the decade between 1891 and 1900 inclusive is 114,017,546 long tons, or 66.5 per cent. or nearly seven-tenths of the total amount mined. The product for the year 1900 surpasses that of any previous year, and is one-ninth of the aggregate of this and all preceding years. It is certain that the product of the current decade will far surpass that of the last decade."

It is most striking that the production for 1907 is also one-ninth of the aggregate of this and all preceding years.

This season as a result of the investigation by the Tax Commission of Minnesota, it has been determined that the Minnesota deposits of ore approximate 1,170,000,000 tons. The total tonnage for the Lake Superior district of the United States, including undeveloped lands, amounts to 2,000,000,000. This, on the basis of last year's consumption, will last fifty years, but as is shown in the preceding table, consumption is advancing with rapid bounds. Already lower grade ores are being marketed than a few years ago was thought possible. In 1907 the standard for iron ore was reduced from 56.7 to 55, and this will undoubtedly continue as iron ore becomes scarcer. Moreover, three-quarters of the ore serves of Minnesota are in the hands of one company. As the scarcity develops on the southern side, the search for ore among the iron formations in Ontario must correspondingly increase. As shown on the map the same geological formations are found throughout Northern Ontario as in Minnesota, Wisconsin and Michigan. One mine in Ontario has already produced one and a third million tons of ore, and two other properties have begun shipment. It will be extremely strange if the banded jasper and hematites found for so many hundred miles throughout Northern Ontario are not in places associated with iron ore, as they are on the south side of Lake Superior. When these surface indications on the Canadian side are followed up as they have been on the United States side, similar ore bodies will undoubtedly be found. The amount spent on exploration on the Vermilion range alone, between Tower and Section 30, a distance of say thirty miles, probably surpasses all the money spent in actual exploration of the hundreds of miles of similar ranges in Northern Ontario. Not only must part of the future demands of the United States be met from Ontario, but the Ontario demand itself must also be provided for. As shown in the accompanying table we only furnished last year per cent. of the ore required for our Ontario furnaces. Indeed from 1901 and onward the per cent. of Ontario ore used in our furnaces has steadily decreased.

Consumption of Iron Ore in Ontario.

	1901	1902	1903	1904	1905	1906	1907
Ont. ore smelted..	109,109	92,883	48,092	50,423	61,960	101,569	....
For. ore smelted..	85,401	94,079	103,137	173,182	383,459	396,463	....
Ratio Ont. ore to total	56 p.c.	50 p.c.	32 p.c.	23 p.c.	14 p.c.	20 p.c.	....
Pig made						275,558	

As stated in the beginning of this paper the record of the production of iron ores in Ontario is rather one of opportunity than of achievement.

It has been suggested by several competent geologists that the only reason that can be suggested why the iron

formations of Ontario should not overlie ore bodies as they do south of the international line would be the greater glacial erosion to the north. This reason does not appeal to me so forcibly as to some. It is generally accepted that the iron ore bodies of Lake Superior have been concentrated in underlying impervious basins by descending waters. The upper portions of the formations are left that much poorer, and it is these that have for the most part suffered erosion. In the "old ranges" of the south shore ore is being mined to a deptr of 2,000 feet, and little of it came from near the surface. Even if it be granted that glacial erosion was carried deeper in Ontario (and this might be successfully disputed) unless it cut nearly to the bottoms of the basins the ore deposits would be only slightly affected. Severe erosion of this kind would have left only shallow and isolated patches of the iron formations instead of the hundreds of miles which are found in Ontario. Moreover, drilling has already established at several points that the formation is at least 500 to 1,000 feet deep. These considerations do not apply to the flat lying Animikie, where a few hundred feet of erosion would cut to the bottom of the basins.

To my mind the most striking differences between the United States and Canadian occurrences are (1) the relative greater abundance of the Keewatin iron formation in Ontario as compared with those of Lower Huronian and Animikie age, and (2) the more frequent occurrence in Ontario of iron pyrite with the ferruginous cherts, etc., of the iron ranges. Apparently iron pyrites and iron carbonate were somewhat equally deposited in the iron formations of Keewatin times, and iron carbonate predominated in Lower Huronian and Animikie times.

References.

[1] Jour. Can. Min. Inst. 9-1906).

[2] Bur. of Mines, Vol. 13, pages 150-152).

[3] Journal of Geology, 1905, or Bur. of Mines, Vol. 14, page 269.

PERSONAL AND GENERAL.

Mr. M. J. O'Brien, of the O'Brien Mine, Cobalt, returned early in March from Mexico and Arizona.

Mr. Floyd Harman, late manager of the Temiskaming Mining Company of Cobalt, has gone to Nevada to take charge of a mine.

Mr. J. Williamson has purchased on behalf of a New York syndicate two gold mining claims situated between Keewatin and Osterund for $24,000.

President Anthony Blum, of the Imperial Gold Mines Company (late Laurentian), Manitou Lake, has returned East after a visit to the property.

Mr. John A. McVicar, manager of the Ontario Government diamond drill, is in Port Arthur for the purpose of testing mineral properties in that district.

Mr. John Moen, a mining man of Nelson, B.C., has returned to British Columbia after a lengthened inspection of the Cobalt, Sudbury and other Ontario mining fields.

Mr. W. R. Birdwood, of Edmonton, Alta., has gone to England with a view of interesting British capitalists in a large salt deposit recently discovered near Fort McMurray.

Mr. Wm. Ogilvie, president of the Yukon Basin Gold Dredglug Company, who has been in San Francisco purchasing machinery for a new dredge, has gone to Whitehorse, Yukon, where the dredge is under construction.

Mr. C. A. Hood, of the Deister Concentrator Company, passed through Toronto on the 10th inst. on his way to Cobalt. Mr. Hood reports four No. 2 tables and two No. 3 tables in commission at the Buffalo mine, and four No. 2 at the Coniagas.

Mr. Graham Fraser, who replaces Mr. David McKeen on the directorate of the Dominion Coal Company, is one of the pioneers in the coal mining and steel industries of Cape Breton, and has been identified with the Dominion and Nova Scotia Steel Companies.

Mr. J. B. Woodworth has just returned to Toronto from the State of Sonora, Mexico, where, in the interests of a small Canadian syndicate, he has taken up an extensive gold-silver property. Mr. Woodworth has also purchased a copper property in Southern Arizona.

CORRESPONDENCE.

Kingston, Ont., March 9, 1908.

The Editor,

Canadian Mining Journal, Toronto.

Dear Sir,—May I call attention to a change in title which has lately appeared in the publication of the Canadian Geological Survey?

The time-honored and quite necessary title has formerly been "Geological Survey of Canada." Every civilized country has a Geological Survey, and it is necessary to distinguish one from aonther. Geology is common to all countries, and we might as well call ourselves "the people" instead of "the people of Canada."

At the recent meetings of the Canadian Mining Institute in Ottawa a map of Rossland was shown which had the following title: "Canada, Department of Mines, Geological Survey Branch." This is surely cumbersome enough, but the title of the last summary of operations is even less explicit, for the word Canada does not appear at all. It reads: "Department of Mines, Geological Survey." Up to 1908 all the publications have the sensible title, "Geological Survey of Canada." Why should it be changed?

Mr. J. C. Drury, speaking at the 1906 meeting of the Canadian Mining Institute, said: "As one trying to earn an honest dollar out there in British Columbia, I hope Mr. Sifton will go on and establish a Department of Mines—swallow up the Geological Survey if necessary." At that time the Geological Survey was itself a Department, and a delegation from the Institute went up to Ottawa on April 18th, 1906, to meet the Premier and the Minister of the Interior, with the object of impressing upon them the necessity of conserving and confirming the powers of the parent institution, the Geological Survey of Canada.

Yours truly,

J. C. Gwillim

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

GLACE BAY.

The present session of the Nova Scotia Local Legislature is taking up an unwonted interest in matters pertaining to coal mining, indeed an extraordinary and significant interest. Dr. Arthur Kendall, M.P.P., for Cape Breton has given notice of the following resolution:—

"That this House considers the time has arrived when the Government and people of Nova Scotia should become acquainted with all the facts, as far as they can be ascertained, relating to the coal mining industry of the province.

"That in accordance with this proposition the House resolves that a Commission, composed of members of the assembly and coal miniing experts, should be appointed, whose duties should be to enquire into and report on the following matters:—

1. The extent and condition of the province's asset in coal.

2. The condition of coal mining leases.

3. The methods employed by promoters to form companies and to obtain capital.

4. The preparation of plans for new mining enterprises and extensions.

5. The methods of mining and losses of coal to the province incident to mining.

6. The prices of coal in this province and beyond the province.

7. The remuneration of miners, provision for old age, for injuries and dependents of miners.

8. The enforcement of laws intended to lessen or prevent accidents.

9. Further requirements to prevent accidents and to afford relief to victims or the dependents of victims.

10. And other matters relating to mining."

This is a somewhat comprehensive menu, and we are left wondering what are the "other matters relating to mining" that have not been mentioned. Surely the doctor has covered the length and breadth, the depth and height, of the science of mining, the gentle art of financing, the ecomomics and the vital statistics of the industry. The work of a Commission that would thoroughly investigate all the matters referred to in the resolution above would be "no picnic." Perhaps, when they had finished their labors, they would produce that long called for and long expected text book, that shall tell us all there is to know about mining. Most of the matters brought up by the resolution appear, however, to have ben dealt with by the Government, who have announced their intention to bring in a Government measure consolidating the Coal Mines Regulation Act. There can, of course, be no doubt that the coal mining industry of Cape Breton and Nova Scotia is of such vital importance to the Province of Nova Scotia that it merits all the attention that can be devoted to it, and the present Government appear to realize this to some extent.

There is one matter which is suggested by the eighth clause of Dr. Kendall's resolution "the enforcement of laws intended to lessen or prevent accidents," and that is the personnel of the mines inspectorate of Nova Scotia. One of the facts that can be ascertained is that nothing will so tend to the prevention of accidents and the preservation of life and property as the existence of a vigilant and capable inspectorate. The men who compose the present force of inspectors are good men, we have no doubt, but they were not appointed by competitive examination, and we do not think that any of them are men with a college training.

The Inspector of Mines should be a man of considerable scientific attainments and extensive knowledge of modern mining methods, in addition to having a thorough grasp of practical mining and all that appertains to it. He should be a man that can advice and direct in case of emergency and danger, and a man whose advice could be sought and relied upon as proceeding out of a well trained experience added to scientific knowledge. No inspector should be appointed for political purposes, and "we consider the time has arrived" when no man should be appointed to an inspectorship, because of his political preferences or as a reward of political loyalty. He should be appointed because his qualifications mark him out as fitted for such an onerous and responsible position. To-day when mines are at work in Nova Scotia with 1,500 persons below, in one mine, at one time, whose lives may be endangered by the ignorance or the stupidity of one man, we require inspectors who can enforce regulations, and explain why they enforce them. The Government of Nova Scotia should have a Chief Inspector of Mines, whose scientific and technical attainments should be beyond reproach. This man should appoint his assistants by rigid competitive provincial examination, such as would entirely eliminate the incompetent and raise the status of the inspectorate. Men of this calibre would need and could not be obtained without the payment of adequate salaries, but in return, we would get adequate men, and it would open up an avenue of promotion for the young and ambitious mining students of the province. The Inspector of Mines should bear the same relation to the colilery manager that the colilery manager bears to his overmen, and the correspondingly more difficult than the colliery manager examination.

As conditions are now, the managers and salaried officials of the coal corporations are men whose wide range of experience and technical knowledge obtained by years of hard study, make them infinitely better able to advise the inspectors than the inspectors are to advise them, which is a reversal of the correct state of affairs. We think it will be found that most of the recent improvements in Cape Breton mining as regards safety—and they are many—have been carried out at the sole initiative of the officials of the coal corporations, who constitute the only body of mining experts in the province.

We have before pointed out in these columns that the mines of Nova Scotia produce more coal with fewer accidents than any mines in the world, and this is not altogether due to naturally safe conditions of mining. It is due to the application of modern mining methods and a consistent regard for anything that will tend to make the mines safer. These conservative methods have not been forced on the operators, who have carried them out, because they thought they were necessary, in many cases at a much increased mining cost. But we think the mine operators of Nova Scotia would welcome the appointment of inspectors of the type we have outlined, and we have yet to find them opposing anything in the nature of progress or safer conditions of mining.

The Commission that was appointed by the Nova Scotia Government to consider the present status of the colliery relief societies and the possibilities of an Old Age Pension Scheme for Nova Scotia have presented their report. The Commission cannot see their way to recommend the adoption of an Old Age Pension Schemes for all workmen in the province, for the reason that the finances of the province could not bear the strain, but they recommend old age pensions for miners, stating that "coal mining may be considered one of the extra hazardous employments not offering to the mass of the employed, much chance for advancement and from the nature of its predisposing to premature disease and consequent disability." The Commission recommend the formation of the Nova Scotia Colliery Workers' Provident Society, which shall be an amalgamation of the existing Relief Societies. The Commission point out the many disadvantages that arise from the present independent action of the Relief Societies, as for instance, the indigence of one society and the

possible bankruptcy of another, compared with the affluence of other societies at newer and better favored collieries. The Commission make the following important comment. "Our investigations have disclosed that the medical men whose certificates are necessary before the claimants can come on the funds for sick benefits are more or less subject to claims that have no merit. None of the present societies have their own doctor, the one whose certificate is accepted being always in the employ of the claimant. Such a system, or the lack of it, can only have one result, namely, a strong tendency to waste the funds on unrighteous claims. This is a detail that might beworked out hereafter, but for the present we may suggest that in some of the mining districts there are societies, which might be grouped for the purpose of employing a medical man who would in no sense be the employee of the members. Further, the branches might employ a paid visitor for the purpose of investigating and keeping down unjust claims, after a medical certificate had been properly granted. Here the Commission have touched upon a very important point, one that we wish to allude to in considering the draft of a Workmen's Compensation Act submitted by Dr. Kendall.

The Commission suggest the formation of an Emergency Fund to be available in case of some extensive disaster. This they suggest should be formed by taking 10 per cent. of all surplus relief funds over $1,000, in the hands of societies, a per capita tax per annum from each member of 30 cents and a special grant of $2,000 from the Government. This fund would be permitted to grow by yearly accretion until it had reached $50,000, after which the widows of miners killed in their work should be allowed to share in the fund. After the fund reached $100,000, it is suggested the fund should take care of the children of miners killed, and that at that time the branch societies should be relieved of this burden.

The Commission further recommend the formation of a Pension Fund and total disability fund entirely distinct and separate from the relief fund. Contributions to these funds would be compulsory on all workmen and the employers, while the Government would contribute their quota. Further particulars can be gleaned from the report of the Commission, but enough can be said to show that they have thoroughly covered the ground and have made a sensible and comprehensive report, with recommendations of a practical character. We are convinced that no better scheme can be devised to meet the exigencies of colliery relief work, than one which distributes the onus over the royalty owner—in this case the Government—the mine operators and the mine operatives, the three classes most intimately concerned. This plan is working well in Germany, and although the recommendations of the Commission do not go so far as the elaborate organization of such a society as the German National Miners Provident Association, or the Knappschafts-Verein, yet they are in effect the same.

The Commission state they consider miners are entitled to Old Age Pensions because their occupation is extra hazardous and their work predisposes them to premature disease. We take exception to these statements. The miners are in line for Old Age Pensions, because their Relief Funds have formed the nucleus of such a fund, and Governments help those who help themselves and the Government. The work of a miner does not predispose him to premature disease. Unfortunately it is only within the past few months that the Government of Nova Scotia has awakened to the necessity of keeping vital statistics, and we cannot give any figures to prove this statement as it refers more particularly to Nova Scotia. But so far as we know the mines of Nova Scotia ocmpare favorably with those of the country, and it is now an acknowledged fact, that miners live longer than other laboring men, longer even than the farm laborer. They work in an atmosphere that is constantly renewed and it is an accepted fact, that for some reason or other coal dust acts as preventive of tuberculosis.

The fact is that the regular work of the miner in an atmosphere that many a woman worker in a factory would gladly welcome, the antiseptic effect of the coal dust, the constant ablutions rendered necessary by his work and the short hours that he works, added to the comparative luxury in which he is enabled to live, by the high wages he receives, render the miner more or less of a favored person among workingmen. In Cape Breton anyway, the "premature disease" he often suffers from, is superinduced by bad whiskey and exposure to the weather under its influence. We may say that we rather doubt the accuracy of the figures in the report that purport to record the number of old men working at the mines. At the same time any man working in Cape Breton over sixty, who has spent his life there, must either have wasted his substance or have been the victim of financial misfortune.

The month of February was exceedingly mild, and delays from weather were very slight. For days the temperature did not fall below forty degrees, and practically no snow fell during the month. The outputs of the Dominion Coal Company for the month, were in excess of any previous outputs for February, reaching the record figure of 285,000 tons. This is over 60,000 tons ahead of February outputs in 1907. The Hub output was over 6,000 tons, the largest since the fire, and the Emery mine No. 10, produced 11,364 tons. This latter mine is now averaging nearly 500 tons per day.

The Conciliation Board began their deliberations on the 2nd March, with an all day session. The chairman of the Board, Prof. Adam Shortt, is a hard worker, and is losing no time in getting at the facts. On the 3rd the Board accompanied by representatives of the men and the company's officers inspected the workings of No. 2 Colliery. They put in six hours in the mine, and afterwards renewed their conferences. If this is the way Conciliation Boards work, we should soon see results. Prof. Shortt is evidently a hustler, and he makes an excellent chairman. The local paper is very indignant that newspaper reports of the proceedings are not to be allowed, and they refer to Prof. Shortt's ruling as "Star Chamber methods." We understand it is the policy of the Government not to take evidence formally at those Conciliation Board metings, and we think their policy is founded on good sense. Formal evidence taking necessitates the presence of a stenographer, and gives the Board meetings too much of the formal air of a court house, and does not conduce to free discussion and open language. Men are apt to unduly measure their words, when they know that some "chiel is present takkin notes" and they do not ventilate their opinions as they would were no stenographer present. Further, we do not know that the general public are interested in the proceedings of th Board. What they are interested in is the finding of the Board, and expressions of public opinion, while the case is under review do not help matters. We think Prof. Shortt is right and the "Glace Bay Gazette" is wrong.

Dr. Kendall has again introduced his Workmen's Compensation Act before the Nova Scotia local assembly. The bill is the same as submitted last year, and is in effect a copy of the British Workmen's Compensation Act, of 1897, with some definitions and amendments that subsequent litigation in England have rendered advisable to properly convey the spirit of the Bill. It is difficult to see what action the Nova Scotia Government can take on this bill, seeing that they are practically committed to an Old Age Pension Scheme and a consolidation of the Colliery Relief Funds. The two things could not exist side by side. We believe that the recommendations of the Old Age Commission are in the right direction, and promise to evolve a national society that will be of real benefit to all concerned. The Workmen's Compensation Act is not a success in England. It is pauperising the working classes, it is driving capital out of the country, it is destroying the friendly societies that were once the stay of the workers, and is recoiling upon those it

was intended to benefit. The gravest flaw in the British Compensation Act, and consequently in the proposed provincial act is its unfair distribution of responsibility. It places all the onus and all the responsibility on the employer, and gives the employee a free rein. More could be said on this matter, and we purpose returning to it. But we think Dr. Kendall's measure is put out of court by the proposals of the Government as to old age pensions and colliery relief. No colliery company could make contributions to a relief society were a Compensation Act to be put in force.

ONTARIO.

COBALT.

A number of the Cobalt members of the Canadian Mining Institute went down to Ottawa for the meeting. On the way down they inspected the smelter at Trout Mills, near North Bay.

The following were the shippers for the month of February:—

	Tons.
O'Brien	257.83
McKinley-Darragh	193.20
T. H. & B.	129.00
Nipissing	127.82
La Rose	72.05
Buffalo	63.67
King Edward	61.93
Trethewey	57.54
City of Cobalt	50.00
Drummond	46.17
Coniagas	32.72
Cobalt Lake	32.45
Temiskaming	28.12
Kerr Lake	21.30

Making a total of 1,173 tons for the month. This is 270 tons more than for the same month last year. The total shipments from January 1st to March 1st, were 2,599 tons, being 716 tons more than for the same period of 1907.

Badger Mine.—The shaft on the No. 9 vein is now down 90 feet. The vein is nine inches in width, carrying smaltite and native silver.

City of Cobalt.—Four inches of very rich ore has been met with in the shaft at a depth of 156 feet.

Cobalt Lake.—This company has shipped a car of ore to the Anglo-French Nickel Company, at Swansea. They are paid for the cobalt contents only. The ore will go over 14 per cent. arsenic, 10 per cent. nickel and about 80 ounces silver.

Right of Way.—Drifting north, form the 150-foot level of the No. 2 shaft, has been started, to conect with No. 1 shaft. There is about 175 feet more of driving to be done to conect the two shafts at the 75-foot level.

The new vein, cut in cross cutting from the No. 1 shaft, is practically all niccolite with native silver.

Coniagas.—Two cars a month, of ore and concentrates, are being shipped regularly from this mine.

T. H. & B.—The cross cut north is now over 300 feet in length. It should cut the big cobalt vein in another 85 feet.

The ore in No. 2 level East, is looking very well. The shaft is down 130 feet.

Four cars of ore were shipped in February. The last returns gave between 47 and 48 thousand dollars for one car and four are expected to be equally rich.

Little Nipissing.—Nearly a carload of ore is ready for shipment. This is all ore taken from the new find on the ground leased from the Peterson Lake Company. It is smaltite and native silver.

Victoria.—Captain Harris, late of the McKinley-Darragh, is in charge of operations here now.

Red Rock.—Mr. R. W. Thomson has taken charge of the work here. He is a Canadian, who has been mining on the Rand for some years.

Kerr Lake Crown Reserve.—Seven tons of ore were shipped by express to New Jersey, for treatment. It is expected that $50,000 will be realized from this shipment as it was specially selected. On the night of the 29th of February, the ore house was broken into, and about $1,000 worth of rich ore stolen. The men who took it were arrested a few days later, and the ore recovered, together with a sack of ore stolen from the Silver Queen. The men were sentenced to one and a half years in the Central Prison.

In going east in the cut, at a depth of 40 feet, what is probably the richest showing ever made in this camp, was met with. The vein here is 25 inches in width, calcite, smaltite, native silver and a little niccolite. Nipissing "49" in all its glory was hardly equal to this. There is nothing in the camp that can compare with the present showing. The vein is thought to be the extension of the Kerr Lake big vein. This find is close to the Silver Leaf line. These latter people are sinking on the same vein.

Silver Cross.—No. 2 shaft is now down 60 feet. At a depth of 50 feet a new vein was encountered, which at the bottom of the shaft shows stronger and carries higher values. The main vein sunk upon, is here 7 inches wide, calcite and smaltite. The work of the past three weeks, 40 feet of sinking, has wonderfully improved this property.

It is expected that the concentrator on the Nipissing will start this week. This is a dry process and the results will be watched with much interest.

LARDER LAKE DISTRICT.—Little work is being done up here just at present. The Reddick expect to set up their twenty stamp mill as soon as milder weather sets in. It is on the ground now. A test of four tons, taken from the dump, was made a short time ago. This lot was run through a three stamp mill and gave results of ten dollars a ton. This is considered an average of the 1,000 tons now on the dump. There are three shafts sunk on this property, 20, 40 and 60 feet deep, respectively.

On the Maxwell-Harris property there is a ten stamp mill, and it is expected that milling will start very shortly.

Lorrain Township.—A rich find of native silver has been made in the unsurveyed portion of this township. When the samples were brought into Haileybury it caused quite a stampede. The samples show smaltite and wire silver. The vein is four inches in width, and has been opened up for some distance. It is stated that the find is in the Keewatin.

Montreal River.—Preparations for extensive development work in the spring are being made, and supplies and equipment are being sent in. Of all the claims passes by the inspector, up to date, 160 of these were passed on native silver showings.

Rib Lake.—In the Harris mine, 16 feet of clean pyrite has been met with in cross cutting. This new ore body runs parallel to that now being worked.

ALBERTA.

EDMONTON.

When the Compensation Act came up in the House for its final reading, there were a number of amendments. The compensation to dependents in case of fatal accident was raised from $1,500 to $1,800, and in the clause providing that a workman should not receive compensation for injuries sustained while at work on a building less than 40 feet high, the 40 feet limit was altered to 30 feet.

The Socialist element in the labor ranks is not at all satisfied with the bill; the reason, probably being that it will remove a grievance and thus give the agitator less chance to enlarge on the sufferings of the workman..

The majority of the Labor men and especially the leaders in the miners' union are well pleased with the Act.

During the debate on the Compensation Act, the privilege of a seat on the floor of the House was accorded by the House to any labor delegate whom any member would care to have beside him to aid him. Mr. Simmons, the member for Lethbridge asked that Mr. Frank Sherman president of District 18 U. M. W of America, as representative of one of the largest labor unions in the country, be permitted to take a seat beside any of the members in the House.

The Socilistic element, as already stated, is against the Act, and at a meeting held in Edmonton adopted the following resolution:—

Whereas, the principle of compensation to workmen for injuries received in industrial pursuits is admitted in all civilized countries, and

Whereas, that 40 foot clause and other exemptions strike at the basic principle of compensation, and

Whereas the amount of compensation re weekly payment and death benefit is entirely inadequate, and

Whereas, the experience of Great Britain in the working out of compensation, despite the existence of the most perfect friendly society machinery in the world, has proven the impracticability of schemes in which contributions are made by the employees has caused the gradual elimination of this feature, and

Whereas, this meeting believes that the only sound, economic and just principle for compensation is payment for the injury through the employer who makes insurance an item in the cost of the manufacturer of the commodity in which he trades.

This meeting hereby places itself on record as being opposed to any compensation act passed in disregard of these facts.

Mr. F. H. Sherman, of Taber, president of District 18 of the United Mine Workers of America, interviewed in Edmonton, stated:—

"The Alberta Government has redeemed its promise to the coal miners, although we would have liked to have gone somewhat further.

"On behalf of the United Mine Workers of America, the largest body of organized labor in this province, I desire to say that the labor legislation passed at this session of the Legislature, while not all that we have hoped for, is a great improvement on the old conditions. We believe this legislation to be an honest attempt to place the wage earners of this province upon an equal footing with the workers of other provinces in the Dominion. However, this legislation, while good so far it goes, cannot settle the question of labor and capital. We accept these new laws only as an instalment of what is due to the workers of this country.

"We desire to thank the entire Legislature for their unfailing courtesy to our representatives and for the considerate treatment we have received at their hands.

"The passing of the Eigh Hours Bill will remove what has long been a bone of contention between us and our employers in this province, and therefore will tend in the direction of industrial peace.

"The Workmen's Compensation Act will result in greater care being taken for the protection of the lives and limbs of the wage earners, and, after all, that is what we require, for you cannot give adequate compensation to the widow and orphans for the loss of their bread winner, nor to a worker for the loss of his limbs.

"The Compensation Act places a value on the lives of our workmen, and we know from experience that steps wil lbe taken by employers of labor to safeguard them."

Lewis Stockett, general manager Bankhead Mines, Limited, and O. E. S. Whiteside, general manager of the International Coal & Coke Company, interviewed the Cabinet on behalf of the Western Coal Operators' Association, with the object of obtaining certain amendments to the Compensation Act and the Eight Hours Bill. They wished to have a clause inserted in the Compensation Act whereby the dependents of a man killed or permanently disabled could not obtain compensation if it could be proved that such man's injury or death was due to his own negligence.

In the Eight Hours Bill they wished several changes made. They want a clause inserted in the bill permitting a mine owner or operator to work his mine not exceeding 60 days in any one calendar year, for one hour per day more than the bill calls for. They claim it would be an advantage to the miners and the public that mines producing domestic coal especially be allowed to work for a longer period during the winter season. The operators also wish a clause making the hours for the men engaged in the handling and transportation of the coal eight hours at their working place. They claim this would work no hardship on these men for the reason that they are not continuously engaged in hard work, as the miner is at the face, and also that they are not exposed to the same danger as the miner. It is also claimed that a great many of these men are drivers, and drive horses and mules and it is necessary that these horses and mules have a lunch hour as well as the men, so that the men and the animals can be fed and watered.

In the case of contract miners they can have their lunch while waiting for shots to be fired or at any other time whenever they have a few minutes to spare, and often in the case of the mine drivers they can eat their lunch while riding on their cars.

The report of the Public Works Department laid on the table of the House shows that the coal production for 1907 in the Province of Alberta exceeded all previous records, amounting to no less than 1,800,000 tons.

Thirty-five new mines were opened and ninety-seven were in operation during the year. Six mines were abandoned and two closed mines were re-opened. In the mines there were 105 accidnts, some of these being very slight. Out of these 105 accidents there were 17 fatal accidents inside and two fatal accidents outside mines, and 18 accidents resulting in serious injury. There were 3,500 persons employed in the mines.

STRATHCONA.

The King has allowed Margaret Jane Lamb, of Newcastle-on-Tyne, Eng., the Edward Medal of the first class in recognition of the gallantry of her brother G. H. Lamb, who lost his life in an endeavor to save the life of the men in the Strathcona Company's mine at Strathcona. The medal presented to Miss Lamb is the second awarded by the King, who founded the medal in 1907 in recognition of the bravery of miners.

The King personally presented the first medal to the recipient.

LETHBRIDGE.

The Public Accounts Committee of the Federal Government at Ottawa investigated the attempt of F. C. Coldwell to obtain 75,200 acres of coal lands near Lethbridge. The regulations up to March last year forbade the acquiring of more than 320 acres by one person from the Department. Coldwell, in March, 1906, sent in 235 applications over the names of different persons, accompanied by a bulk cheque for the necessary $5 fees. Though the Department does not issue forms, many of these were on printed forms and the signatures very vague, many only having the initials of the Christian names and some only having surnames.

Forty-seven applicants were women. Many were chamber maids and bell boys in the Russell House, Ottawa.

The purport of the examination was to ascertain what precautions were taken by the Department. H. H. Rowan, the present head of the Mines Branch of the Department, explained that it was not the business of the Department to scrutinize the applications until called upon to issue patents, when steps would be taken to identify the applicants and make sure of their good faith.

Only ten of the applications were granted.

DIAMOND CITY.

Development work at the mines has been proceeding rapidly all winter, but has been temporarily stopped. The building operations in connection with the surface plant have also stopped, all the available brick being used up. The Diamond Coal Company manufactures its own brick from an excellent clay deposit on the property, and as all the bricks made last summer have been used, building operations will cease till spring opens up and new kilns of bricks can be burned.

BRITISH COLUMBIA.

THE KOOTENAYS.

Mining in Rossland is taking on a little brighter aspect at present than it has experienced for some months back. A rich ore shoot carrying gold from $17 to $40 per ton has been cut on the 1,650 foot level of the Le Roi mine. This is encouraging in the face of the fact that the values on the 1,650 foot level so far have been rather low. As to whether this new strike will prove to be extensive, that will depend on future development work, but the company has been working in the ore for a couple of weeks. The ore is of a pyritic character and where the quartz is mixed with it the gold values run high. At the same time there is an excess of iron over silica.

Shareholders of Le Roi 2 Company have been informed by cable that they are to receive another dividend of two shillings per share. The Blue Bird, Red Eagle and Homestake properties have been leased in the South Belt and several others are covered by options. The coming summer will see much activity in this section. It is to be hoped that the lessees will strike something good and prove up this part of the camp. They have some good ore in sight, averaging $50 to the ton.

Rossland will receive at least $3,000 of the 2 per cent. tax as its share this year, but will make an effort to get more. It is claimed that the city should receive $20,000 of this tax per annum. Owing to the Government taxing the mines which are in the city limits the corporation of the city of Rossland cannot collect from them.

The following tonnage was shipped from the camp during the week ended March 3rd:—

	Tons.
Centre Star, Cons.	3,180
Le Roi	1,249
Le Roi 2	770
Evening Star	30
Total	5,229

At the Trail smelter during the same week 4,708 tons of ore were received, not including the ore received from Rossland mines. The St. Eugene sent 398 tons, War Eagle 174, North Star 68, Vancouver 20 and many other smaller lots.

The Consolidated Mining & Smelting Company of Canada has issued a statement to the stockholders of operations for the period from July 1st to December 31st, 1907. The following were the shipments from the three mines:—

Centre Star group, Rossland	87,451 tons	(gold-copper)
St. Eugene group, Moyie	75,104 tons	(silver-lead)
Snowshoe group, Phoenix	86,109 tons	(copper-gold)
Total	248,664 tons	

The St. Eugene produced 12,110 tons of silver-lead concentrates. The average amount of ore received at Trail smelter was 1,116 tons per day. Amount of lead-silver bullion produced was 42 tons per day, valued at $165 per ton; copper matte 14.8 tons at $453 per ton; pig lead 38.4 tons, value $97 per ton. The gross value of the output for the year will approximate $6,000,000. The ore reserves in the mines are looking very well. Another recent shipment of 120 tons of ore from the lower workings of the War Eagle at Rossland carried $40 per ton in gold. The ore recently encountered in the Le Roi is of the same appearance and character as that found in the lower depths of the War Eagle.

While the Granby profits have closely approached the disappearing line with the recent fall in copper, they are yet actively pursuing mining and smelting operations, and in fact have broken a couple of their former time records. The smelter treated 3,450 tons of ore in 24 hours a week ago and for the week ended February 29th thy exceeded all former records and shipped 22,938 tons from mines to smelter. The total ore shipments for the year so far have been 146,947 tons. The smelter treated 22,545 tons during the above week, making 146,673 tons for the year to that date. The pay roll at the Granby mines is $50,000 per month, and there are 340 men working around the smelter at Grand Forks, the pay roll averaging $30,000 per month.

The Boundary mines shipped during the year 1907 a tonnage of 29,423,856 as against 30,375,924 tons for the calendar year 1906. The hours of work at the Granby mines have been changed to conform with the law and hereafter the eight hour shifts will begin at 8 a.m., 4 p.m. and midnight, instead of an hour earlier as heretofore.

The Snowshoe and other Boundary copper mines have made no move to resume operation, and it is not likely that they will do so until copper makes an advance of two or three cents per pound.

The new 500 horse-power motor and part of the new Rand tandem, compound, duplex, Corliss, 3,474 foot air compressor which is will drive have arirved at the British Columbia Copper Company's mine, and will be in readiness to operate when work is resumed.

The Crescent Mining Company, a Chicago enterprise, shipped a 20 ton car of high grade ore last week. This ore is being stoped from the 225 foot level and it is expected will return the company about $100 per ton. The electrical plant is working well. A shaft is being driven on the Tip Top, another high grade property, and is now down 100 feet.

A small force of men are working on the Maple Leaf group in Franklin camp. If the propery turns out well and the $125,000 bond is taken up by the New York Company it is understood that a merger will be attempted and other important Franklin camp properties secured. In case this was done a smelter would be built at Franklin, as the ores are low grade and a lot of the profit is eaten up by hauling to distant smelters.

Getting out railway ties furnished employment to over 400 men in the Boundary this winter. In the local camps over 400,000 were made, which at 30 cents a piece means the distribution of $120,000 among local interests.

At the Nickle Plate mine of the Daly Reduction Company, Hedley, over 140 men are now employed. The company did not experience any friction when the wage scale was lowered all over the district, and their miners are now receiving $3.50 for eight hours, the same as is paid in the Boundary and elsewhere. The company has 110 stamps dropping in its mill at Hedley and is shipping high grade concentrates. Nickel Plate ore carries $80 per ton in gold and silver.

A strike of good gold ore in new ground has been made at the Queen mine, Salmo. The ore was opened up at the bottom of a shaft 80 feet below the fourth level of the mine. The ore in the bottom is six feet wide, while the ledge higher up the hill is only four feet in width. Manager Waldie has completed the installation of his new 10 stamp mill, which now gives him twenty stamps

altogether. A new Jenckes hoist and a Rand air compressor are on the way to the mine and will be installed before the snow disappears. The Nugget, Mother Lode and Kootenay Belle are all shipping a small tonnage regularly. The Fern mine is being operated.

The Hewitt Mining Company has shipped another car of silver-lead ore carrying 185 ounces silver and 7.5 per cent. lead.

The Krao mine, which was floated at Butte last year with a capital of $600,000, may be consolidated with adjoining Ainsworth properties and capitalized for $2,000,000. Meantime, it will be necessary to run a long tunnel to tap the ore bodies at depth, owing to the inflow of water in the shaft workings.

The Westmount mine has shipped a car of pyritic ore carrying 300 ounces of silver. This high value of silver in the iron pyritic ore has proved something of a surprise to mining men in that section, and it is stated that the prospectors will not overlook pyritic showings this coming season.

The output of the Ferguson Mines Company for the year 1907 averaged 150 tons per month, valued at $140 per ton in gold, silver and lead.

If the copper and timber markets pick up a little within the next few months British Columbia will experience a year of splendid prosperity. What with the heavy expenditures that will be made in connection with work on the Grand Trunk Pacific, Canadian Pacific and Great Northern and the mining industry looking very good, considering the present state of affairs, the people of this province should enjoy a prosperous year.

GENERAL MINING NEWS

NOVA SCOTIA.

GLACE BAY.—Shortly after noon on March 8th the coal washer of the Dominion Coal Company at Port Morien was completely destroyed by fire. The loss will reach about $100,000. Considerable coal was also lost. This is the second fire within two years. Sixty thousand tons of coal monthly was the working capacity of the plant, about fifty thousand of which were shipped to the Everett Gas & Coke Company, near Boston.

SYDNEY.—The Dominion Iron & Steel Company at No. 2 slope, Wabana, Newfoundland, on Friday, February 28, broke all previous records in hoisting thirteen hundred tons of ore from a single slope. This record for an iron ore mine is said to be unprecented in America.

HALIFAX.—It was announced on Wednesday, March 4th, that Mr. Graham Fraser, popularly termed "the father of the iron and steel industry in Nova Scotia," had been elected a director of the Dominion Coal Company, to fill the vacancy created by the resignation of Senator David McKeen. The other Nova Scotian on the Board is Mr. W. B. Ross, K.C., of Halifax.

BRITISH COLUMBIA.

NELSON.—For the week ended February 22nd a larger number of mines, including some new producers, have made shipments. Both the British Columbia Copper and the Dominion Copper are still shut down; but the Granby is putting out a record tonnage at mine and smelter. At Rossland the Centre Star is increasing its tonnage; but Le Roi is limiting itself to about 1,500 tons. The Westmount, a new Slocan mine about 10 miles from Slocan city, made a shipment of one car of rich silver ore in which iron pyrites is associated with the silver bearing minerals.

ROSSLAND.—The Red Eagle mine has been leased by Dr. D. E. Kerr and N. Smith to Richard Hooper, Martin Daly and Samuel Lynn for a year and a half.

VICTORIA.—The bill now before the British Columbia Legislature to amend the Placer Mining Act fixes the size of placer claims in creek diggings at 250 feet in the general course of the stream and 1,000 feet in width, measurement from the general course of the stream 500 feet on either side of the centre thereof. Bar diggings are fixed at 250 feet square on any bar covered at high water, or a strip of land 250 long at high water mark from high water mark to low water mark. Dry diggings to be 250 feet square.

The bill authorizing a loan of $10,000 to the Canada Zinc Company was read a third time and passed, the Premier stating, in reply to Mr. Hawthornthwaite, that the operation of the process would be watched by an officer of the Government on its behalf.

PHOENIX.—The new Boundary shipper, the Crescent mine, will ship one or two cars of gold-silver ore per month. The shipping ore is stoped from the 250 foot level. Only a dozen men are employed.

NELSON.—For the week ending February 29th the Granby mines shipped the largest amount of the year—22,919 tons of ore as compared with 17,147 tons during the previous week. The Granby smelter treated 22,546 tons, also a record.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The bill to amend the Coal Mines Regulation Acts by limiting the hours of work underground to eight was introduced in the House of Commons by Mr. Herbert Gladstone on February 20th and read a first time.

The King Edward medal, instituted as a reward for gallant conduct in saving or attempting to save life in mines was personally presented by King Edward on February 27th to Francis Chandler and Wm. Everson. Miss Margaret J. Lamb, a resident of Newcastle-on-Tyne, also received the medal as a recognition of the bravery of her brother, G. H. Lamb, who lost his life in an attempt to save the lives of comrades in the Sthrathcona mine, British Columbia.

NORWAY.

The Hohenloche-Werke-Akbiengesselschaft, a German company, have acquired extensive deposits of zincblende and galena in Norde Hakedal and Nannestad at a price of about £61,000.

The Hassel iron mines, which have not been in operation for more than century, are to be reopened by a company which is be-

ing organized with £47,000 capital. The ore will be smelted with charcoal obtained from the waste wood of the neighboring forests and saw mills.

GERMANY.

The Prussian Government, which operates in all 39 mines of various minerals, and numerous metal works, realized a surplus of £1,372,242 on the year's operations for 1906. These industries employ 89,130 men.

A noteworthy paper was read by Mr. A. Haarmann, of Osnabruck, a leading German railway authority, at the last meeting of the society of German Ironmasters at Dusseldorf, in which he expressed the opinion that iron should take the place of wood as material for railway sleepers. He submitted figures to show that in iron-producing countries the wooden sleeper cost at least 85 per cent. more than the iron sleeper.

An expendition which since last July has been prospecting for phosphates in the German Islands in the South seas has found deposits on several islands, those of Fais, of the West Carolines and Angauer in the Palan group being especially rich.

RUSSIA.

Dredging for gold in the Ural and the Enisseysk mining district has proved a failure. Of 50 dredges working in Russia only four or five have yielded a profit.

Extensive deposits of quartz and placer gold have been discovered along the Peitcha river in Ussuri province, but prospecting and work have been interfered with by Chinese robbers.

The coal basin of Kussnetska, Western Siberia, where as much as 250,000,000 poods of coal are in sight, will shortly be connected with the Siberian Railway.

AUSTRALASIA.

At the Mount Lyell copper mine, Tasmania, boring at the 1,000 foot level has shown the downward continuation of one of the shoots worked at the 850 foot level and largely increased the estimate of the ore reserves.

The mineral yield of New South Wales for 1907 is a record one, being valued at £10,577,378 as compared with £8,169,625 in 1906. The number of persons employed in mineral production was 43,758.

The gold output of New Zealand for January last amounted to 59,072 ounces, valued at £231,508, as against 27,510 ounces, value £107,117, for January, 1907.

INDIA.

The development of the manganese industry in the Central Provinces has been very rapid, especially in the Balaghat district, from which about 21,000 tons were shipped in 1904-5. During the year ending June 30, 1906, the shipments were over 50,300 tons, and the quantity has since been steadily increasing.

SOUTH AFRICA.

The Transvaal Chamber of Mines has instituted a competition in rock drills. Manufacturers are asked to send out from six to nine drills to work under ordinary mining conditions for a period of from four to five months under the supervision of a committee. The prizes for the manufacturers is to be £4,000 and £1,000, and to the operators not less than £250. The trials are to commence January 1st, 1909.

The net gain in the number of native laborers employed in the Transvaal mines during January was 11,914, the total number employed at the end of the month being 118,204.

Several amalgamations of Rand mining properties are being negotiated with a view to economy in operation. The consolidation of the Klipriversberg Estate and several other concerns, if ecected, will place 1,085 mining claims under one management.

A copper proposition some 18 miles northwest of Upington, Cape Colony, 45,000 acres in extent, is being opened up by Mr. W. Bleloch and his associates.

UNITED STATES.

The Wayne Iron Company has acquired 600 acres in Wayne county, New York, which it is estimated will produce from 3,500,000 to 4,000,000 tons of iron ore. They expect to get out about 1,000 tons a day, which will be placed on the market this season. The property is about 75 miles from Buffalo.

A law goes into effect in Indiana May 1st prohibiting railroad companies from owning coal mines and coal lands in the State. A big combine in which railway magnates are prominent is being formed to take over the coal mining properties.

Work has been resumed in the mines of the Amalgamated Copper Company, Butte Coalition, and North Butte Companies at Butte, Mont., which have for some time been idle. It will be about four months before any copper can be produced for the market.

MEXICO.

An explosion recently took place in the La Rosita coal mine of the Sabines Coal Company at Sabines, Coahuila, by which about 100 miners, Japanese and Mexicans, were killed. Fire damp is believed to have been the cause.

Mr. Frank G. Stevens, representing Canadian and British capitalists, has purchased mines in the Hostotipaquillo district, Quadalajara, from Carlos Romero. Mr. Stevens will devote his attention to operating the properties, which include the Mololoa mine, one of the oldest in the district.

Mr. J. W. Bryant, representing the Tyee Copper Company of British Columbia is in Mexico in connection with a project for procuring Mexican ores for smelting in British Columbia.

The famous Calumet and Hecla mine, which has just sliced its quarterly dividend from $15 to $5, has paid out $107,350,000 in dividends since its inception.

The stock a year ago sold as high as $1 a share, but yesterday was down as low as 601, breaking 49 points on the declaration of the dividend.

In 1903 the stock was as low as 384.

The mine's dividend record since 1900 is as follows:—

Year.	Per share.	Amount.
1900	$75	$7,500,000
1901	45	4,500,000
1902	25	2,500,000
1903	35	3,500,000
1904	40	4,000,000
1905	50	5,000,000
1906	70	7,000,000
1907	65	6,500,000
1908	15	1,500,000

COMPANY REPORTS.

DOMINION COAL COMPANY, LIMITED.

Report of Directors for year ending December 31st, 1907.

Company's Operations.

The output for 1907 was 3,541,253 tons, as compared with 3,552,746 tons for 1906, or 11,493 tons less than in the corresponding period. The decrease was due to the fact that mining operations had not been resumed at No. 7 mine since the fire which occurred in December, 1906. The business of the company has been adversely affected by the following circumstances:—

The weather experienced throughout the winter and the spring was abnormally severe, thereby delaying the opening of navigation at Sydney by about four weeks, and owing to the presence of drift ice along the Nova Scotia coat and in the Gulf, the regular shipments to the St. Lawrence did not begin until June 6th. These unusual conditions rendered it impossible to get up the full quantity of coal required for St. Lawrence points during the season of open navigation; supplementary shipments had to be made via Portland, Maine, after the closing of the river, entailing heavy additional cost of railway carriage from that port to Montreal. The delays to steamers also caused an increase in the freighting costs.

Mining costs have continued to increase greatly, by reason of the scarcity of labor, the irregular working of men and the high prices paid for all materials used at the mines, including hay and feed for the horses; these conditions were the most unfavorable in the history of the company.

Company's Property.

No. 7 mine was idle nearly all the year on account of the fire as above noted, which destroyed the bankhead and all surface works, and necessitated the flooding of the mine from the ocean. The flooding was stopped on January 29th, 1907, and pumping out commenced immediately after; the first coal was hoisted on November 27th. All surface works have been replaced and are now in first-class order, and the mine in condition to give a normal output next season.

New Works.—One of the new mines (No. 12) referred to in the last annual report, has been opened in the Lingan-Victoria district. The main slope has been driven 390 feet, and the back deep 335 feet, and first levels have been broken off. The prospects in this district show great promise and when fully developed the new colliery will produce a substantial output. The construction of the branch line (about seven miles in length) connnecting this district with the main line of the company's railway, has been commenced. The bush has been cleared for four miles and grading completed for two miles. Some 368 acres of land have been purchased for the surface works, town site and reservoir, and the necessary clearing has been completed to a sufficient extent to admit of the erection of the temporary mine buildings, boarding houses and stables.

Following the policy already established by your directors to safeguard in every possible manner life and property, careful attention has been paid to the prevention of fires both for underground and surface works. All collieries are periodically inspected by a special fire inspection committee, and regularly drilled fire brigades are organized at each of the collieries. Safety lamps are now in us at all mines.

A rescue station at a central point with full equipment has been established, including twenty sets of "Draeger Breathing Apparatus," to enable men in any emergency to work in a poisonous atmosphere. A volunteer corps for such service has been organed and the men have been drilled in the use of the apparatus by a competent instructor brought over from England.

A horse hospital has been erected, in which the sick and injured mine horses are properly treated with satisfactory results.

Wrecking Plant.—In response to the invitation of the Federal Government to tender for the establishment of a wrecking plant to afford aid to wrecked, disabled or stranded vessels within the coastal waters of the Maritime Provinces and the Gulf of St. Lawrence, an offer was submitted by the company which was accepted, and an agreement entered into for five years. Certain of the company's steamers have been assigned to this duty and a complete outfit purchased. During the eight months of its existence assistance has been rendered to eleven vessels.

New Coast Steamer.—Owing to the great difficulty experienced in obtaining schooners to carry on the coastwise trade, a specially designed steamer was built in Scotland to the company's order. This steamer, the "Cabot," arrived at Sydney on September 21st, and has been continuously employed in the trades since that date.

Loading Plant at Glace Bay Harbor.—A trestle and chute have been erected at this point to provide return cargoes for sailing craft coming in with lumber and produce, and the berth in this harbor dredged to enable vessels to lie alongside. These facilities have proved advantageous to the company.

Rolling Stock, Etc.—One new main line locomotive and one new bank-switching locomotive have been purchased during the year. Also one new steam shovel for the banking station. The capacity of the banking station has been increased by building new turn-out and trestle. Scales for weighing coal on cars have been installed in Nos. 1, 2 and 4 colliery yards. A new foot turntable has been erected at the Glace Bay round house.

New dwelling houses for miners were erected as follows:—No. 5 colliery, 29 houses; No. 4 colliery, 1 house; mechanics' row, 1 house; and one boarding house in No. 2 district, and construction started on one hundred additional houses at various places. A census was taken in October showing a total population of 10,600 persons occupying the company's houses.

A new bankhead to serve both Emery and Phalen seams at No. 5 colliery has been built and was put in operation on July 1st, replacing the old bankhead destroyed by fire in October, 1906. Also a new machine shope equipped with all necessary modern tools.

Electric Power Transmission.—The third unit has been installed at the central electric station at No. 2, and the use of electric power extended during the year by the installation of an electric underground haulage engine at No. 3 colliery, the introduction of electrically driven turbine pumps at several collieries, electric motors to run the central machine shop at Glace Bay and at No. 2 colliery, and the bankhead machinery at No. 5 and No. 7 collieries, and for hoisting tanks at No. 8 water shaft.

The company's property generally has been maintained in a state of efficiency and the development of the mines regularly carried on so as to insure the best possible results.

Company's Stores.—The management of the Commercial Stores, which was found to be most unsatisfactory, has been completely changed and the pernicious system of allowing long time and indiscriminate credits to workmen discontinued. A careful inventory of the goods in stock has been taken and loss for depreciation provided for.

General.

The suit taken against the company by the Dominion Iron & Steel Company, referred to in the last annual report, was tried at Sydney (July 30th to August 19th) before Mr. Justice Longley, and judgment given in the plaintiff's favor on September 15th. Your directors have throughout been acting upon the advice of eminent counsel, but after this reverse for their fuller satisfaction they took other counsel into consultation, who were unanimous in their opinion that the Coal Company's contentions were right and would eventually be maintained. The appeal taken

before the Supreme Court of Nova Scotia was heard at Halifax on December 17th, 1907, and a decision in favor of the Steel Company was given on January 14th, 1908. Since receiving this second adverse judgement, and in view of the appeal which has been taken to the Privy Council, your directors have submitted the case separately to three prominent members of the Ontario bar, and to two United States lawyers of high standing. In each case an entirely favorable opinion has been received, and your directors consider that the recent decisions should be reversed and judgment given in favor of this company.

Your directors regret that the annoyance and expense of a protracted litigation should continue to be borne by the company, but as no genuine response has up to the present been made by the Steel Company to the numerous overtures put forward from time to time by influential friends of the two companies for a settlement on fair and equitable lines, the only alternative would have been complete surrender to the Steel Company's unreasonable demands. The questions involved are so vital to the prosperity of this company and your directors' belief in the justice of the company's cause and its ultimate success in the suit being well assured, they have had no alternative in the best interests of the shareholders but to earnestly prosecute the appeal to the Privy Council.

Your directors, however, continue ready to discuss any feasible scheme of settlement offered by the Steel Company, recognizing that in view of the intimate relations which must inevitably exist between them, an amicable termination of the dispute would redound to the greater advantage of both companies.

Respectfully submitted,

JAMES ROSS, President.

PROFIT AND LOSS ACCOUNT.

For Year 1907.

Net proceeds from sale of coal and net income from steamships, railways, real estates, etc...		2,094,539.23
Less		
Interest on bonds	250,000.00	
Dividend on preferred stock	210,000.00	
Miscellaneous interest	32,171.13	
Dividend on common stock	600,000.00	
		1,092,171.13
		1,002,368.10

Certified correct,

W. S. ANDREWS, Auditor.

At the annual meeting of the British Columbia Copper Company, held recently in Charleston, W. Va., the president, Mr. Colgate Hoyt, asserted that the year ended November 30th, 1907, had been the hardest in the history of the company. The fuel famine of last spring, the recession of copper prices, and the shortage of cars were, according to Mr. Hoyt, the chief reasons for the trying times. The capacity of the excellently equipped smelter at Greenwood is 2,000 tons of ore per day, but during the past year the plant could only be operated at about one-half its capacity. The dividend of 40 cents per share paid last July had been made possible by high prices and continuous operations.

Had it been possible to get the price for the copper shipped at date of shipment, the net profits of the company would have been $396,534.30.

Two hundred and sixty-eight thousand two hundred and thirty-one tons of ore was mined on the company's own properties. The Lone Star and Washington property was purchased and paid for, the consideration being $75,000. Development work was performed at an outlay of $114,898. The mines and reduction works were closed in November pending a rise in copper.

The profit and loss account for the year ended November 30th, 1907, is as follows:—

Balance Dec. 1st, 1906	$231,022
Premium on stock sales	57,118
Adjustment account	21,724
Income for year ended Nov. 30, 1907.....	88,158
Total	$398,018
Expenses	20,777
Net	377,241
Dividends	201,200
Surplus	176,041

The directors re-elected include:—Copely Amory, Anthony N. Brady, C. H. Burke, Newman Erb, Colgate Hoyt, Edwin Hawley, B. B. Lawrence, J. C. Reiff, F. L. Sommer, C. A. Starbuck, and F. L. Underwood.

At the annual meeting of the Crow's Nest Pass Coal Company, held in Toronto March 10th, the following officers were elected:—Mr. G. G. S. Lindsey, President; Hon. Robert Jaffray, Vice-President; Sir Henry Pellatt, Second Vice-mresident; Mr. E. R. Wood, Treasurer; Col. W. P. Clough (New York), Mr. H. B. McGiverin (Ottawa), Mr. C. E. Whitney (Ottawa), Mr. Elias Rogers (Toronto) and Mr. Jay P. Graves (Spokane), directors. The report for 1907 was submitted, showing net profits for the year of $382,986.28, an increase of $31,195 over 1906. To this has been added $353,592.42, balance at credit of profit and loss brought forward from 1906, and $324,420 representing premiums on new stock, making a total of $1,060,998.70. From this amount four quarterly 2 1-2 per cent. dividends have taken $355,178.98, $324,420 has been transferred to reserve, and $381,309.72 has been carried forward to credit of profit and loss. The amount of coal mined in 1907 was 981,939 tons, as against 806,901 tons in 1906, and the production of coke was 231,368 tons, as against 213,295 in 1906. A strike of the miners in April, and the closing down of the smelters, materially lessened the company's output. During the year the company spent in improvements a total of $493,818.73. The report states that the costs of mining and coke-making in 1907 were increased greatly by reason of the advance in wages to miners, the irregular working of the men, the scarcity of labor, expense of securing new miners, higher prices of material, increase in freight rates, larger cost of compensation for injuries to workmen, and extremely servere weather during the first three months of the year. Besides, a fluctuating demand for coal involved pressing the mines at times for tonnage, which naturally raised the cost. These conditions were the most unfavorable in the history of the company.

The annual meeting of the shareholders of the Intercolonial tCoal Mining Company, Limited, took place recently at the office of the company, room 312 Merchants Bank Building.

The output of coal and coke for the year ending 31st December, 1907, amounted to 317,599 tons.

The following gentlemen were elected directors for the coming year: Messrs. James P. Cleghorn, W. M. Ramsay, A. W. Hooper, R. MacD. Paterson, K. W. Blackwell, E. Goff Penny and D. Forbes Angus.

At a subsequent meeting of the board, Mr. James P. Cleghorn was re-elected president, Mr. D. Forbes Angus was re-elected vice-president and managing director, and Mr. C. A. Dowd was appointed secretary-treasurer.

The Kerr Lake Mining Company has declared the regular dividend of 2 per cent. quarterly with a bonus of 1 per cent.

STATISTICS AND RETURNS.

PRELIMINARY REPORT ON THE MINERAL PRODUCTION OF CANADA IN 1907.

(Subject to Revision.)

METALLIC.

Product.	Quantity. (a)	Value. (b)
Antimony ore, tons	2,016	$ 65,000
Copper, lbs.	57,381,746	11,478,644
Gold—Yukon	$3,150,000	
Gold—All other	5,114,765	
		8,264,765
Iron ore (exports) (e), tons	25,901	45,907
Pig iron from Canadian ore (d) tons	107,599	1,982,307
Lead (e) lbs.	47,565,000	2,532,836
Nickel (f) lbs.	21,189,793	9,535,407
Silver (g) oz.	12,750,044	8,329,221
Cobalt, zinc, and other metallic products		200,000
Total metallic		42,434,087

NON-METALLIC.

Arsenic (refined) lbs.	660,080	36,210
Asbestos, short tons	62,018	2,482,984
Asbestic, short tons	28,519	22,059
Chromite, short tons	7,196	72,901
Coal, short tons	10,510,961	24,560,238
Peat, short tons	50	200
Corundum, short tons	1,892	177,922
Feldspar, short tons	12,584	29,809
Graphite, short tons	579	16,000
Grindstones, short tons	5,382	46,876
Gypsum, short tons	475,508	642,470
Limestone for flux in iron furnaces, short tons	359,503	298,097
Mica, short tons		333,022
Mineral pigments—Barytes, short tons	2,016	4,500
Mineral pigments—Ochres, short tons	5,828	35,570
Mineral water, galls.	250,985	110,524
Natural gas (h)		748,581
Petroleum (i), bbls.	788,872	1,057,088
Phosphate, tons	750	5,514
Pyrites, tons	39,133	189,353
Salt, tons	72,697	342,315
Talc, tons	1,534	4,602
Tripolite, tons	30	225
Total		31,217,060

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

Cement, natural rock, bbls.	5,775	4,043
Cement, Portland, bbls.	2,368,593	3,374,828
Flagstones, square yards	3,000	2,550
Sands and gravels (exports) tons	298,095	119,853
Sewer pipe		1,211,000
Slate, squares	4,335	20,056
Building material, including bricks, building stone, lime, etc., estimated on the basis of production in 1906		7,500,000
Total structural materials and clay		12,232,330
Total all other non-metallic		31,217,060
Total non-mtallic		43,449,390
Total metallic		42,434,087
Estimated value of mineral products not returned		300,000
Total, 1907		86,183,477

(a) Quantity of product sold or shipped.

(b) The metals, copper, lead, nickel and silver, are, for statistical and comparative purposes, valued at the final average value of the refined metal in New York. Pig iron is valued at the furnace, and non-metallic products at the mine or point of shipment.

(c) Copper contents of ore, matte, etc., at 20.004 cents per pound.

(d) The total production of pig iron in Canada in 1907 was 651,962 short tons, valued at $9,125,226, of which it is estimated about 107,599 tons valued at $1,982,307 should be attributed to Canadian ore, and 544,363 tons, valued at $7,142,919 tons ore imported.

(e) Lead contents of ore matte, etc., at 5.325 cents per lb.

(f) Nickel contents of matte shipped at 45 cents per lb.

(g) Silver contents of ore, etc., at 65.327 cents per oz.

(h) Gross return from sale of gas. Additional returns increase this item to $803,908.

(i) Deduced from the amount paid in bounties and valued at $1.34 per barrel.

ANNUAL PRODUCTION SINCE 1886.

1886	10,221,255
1887	10,321,331
1888	12,518,894
1889	14,013,113
1900	16,763,353
1891	18,976,616
1892	16,623,415
1893	20,035,082
1894	19,931,158
1895	20,505,917
1896	22,474,256
1897	28,485,023
1898	38,412,431
1899	49,324,005
1900	64,420,983
1901	65,804,611
1902	63,211,634
1903	61,740,513
1904	60,073,897
1905	69,525,170
1906	79,057,308
1907	86,183,477

SUMMARY STATEMENT OF THE OUTPUT OF THE MINES IN THE PROVINCE OF QUEBEC FOR 1907.

(Courtesy of Mr. J. Obalski.)

Kind of Minerals. (Tons of 2,000 lbs.)	Wages paid.	No. of work-men.	Quantities shipped or used.	Gross value
Bog iron ore	28,974	100	22,681	80,231
Calcined ocre	20,197	75	2,300	29,430
Raw ocre			2,700	5,400
Chromic iron	31,801	76	6,407	63,130
Copper ore	103,884	250	29,574	160,455
Asbestos	915,081	2,081	61,833	2,441,919
Asbestic			29,193	27,293
Mica, trimmed (pounds)			559,247	199,848
Mica, untrimmed	100,600	275	91	13,660
Phosphate			408	3,410
Graphite	15,000	75	120	5,000
Magnesite			35	5,000
Slate (squares)	15,000	50	4,336	20,050

Flagstones (yards)	1,350	6	3,000	2,550
Cement (barrels)	170,000	350		640,000
Granite (cu. yds.)	238,761	653	51,873	560,236
Lime (bushels)	33,500	134	556,000	96,000
Bricks	300,000	1,462	94,000,000	525,000
Tiles and pottery				270,000
Limestone (cub. yds.) ..	155,882	515	97,710	223,580
	2,130,010	6,092		5,367,198

Note.—These figures do not include the value of the metal content of the ore, nor the pig iron and ferro-chrome manufactured in the province; nor do they include the natural gas. By adding these items the total value would be increased to $6,000,000 or $7,000,000. The figures above apply to prices paid at shipping points and have been compiled from the reports of operating companies. The figures are practically correct, but are subject to slight corrections.

ASBESTOS.

The production shipped, during the year of 1907, from the different districts of the province, is as follows:—

Tons of 2,000 lbs.	Tons.	Value.
1st class (crude)	1,485	$367,188
2nd class (crude)	2,888	456,073
Fibre	19,805	772,513
Paper stock	37,655	846,145
Total	61,833	2,441,919
Asbestic	29,193	27,293
Total value		$2,469,212

Two thousand and eighty-one workmen have been employed and $915,061 in wages were to them. They have worked the whole year in the principal mines.

MICA AND CHROME.

The production of mica shipped may be summed up as follows for 1907:—

	Lbs.	Value.
1-2 Thumb trimmed	204,276	$30,633
1-3 Thumb trimmed	139,240	34,891
2-3 Thumb trimmed	86,003	44,460
2-4 Thumb trimmed	71,852	49,235
3-5 Thumb trimmed	24,248	20,090
4-6 Thumb trimmed	12,597	13,083
5-8 Thumb trimmed	4,074	5,347
Total thumb trimmed ...	542,290	197,739
Split	7,957	2,109
	550,247	199,848
Crude mica having undergone a first classification, 91 1-2 tons (2,000 lbs. to a ton)		13,660
Total value		$213,508

The mica industry in the province has employed 275 workmen, of which 150 have worked on the mines and the others on the classification. The work has been done during the periods of 6 to 12 months, and a sum of $100,600 has been paid in wages.

The production of chrome for 1907 has been as follows (2,240 lb. tons):—

		Value.
1st class, in lumps	145	$ 1,925
2nd class, in lumps	3,536	33,485
Concentrated	2,040	27,720
Total	5,721	63,130

Corresponding to 6,407 tons of 2,000 lbs.

Seventy-six workmen were employed during periods of 4 to 11 months.

MINERAL OUTPUT OF ONTARIO FOR 1907.

METALLIC.

	Quantity.	Value.
Gold, ounces	3,810	66,399
Silver, ounces	10,005,749	6,155,166
Cobalt, tons	751	104,426
Nickel, tons	10,972	2,271,616
Copper, tons	7,373	1,045,511
Iron ore, tons	205,295	482,532
Pig iron, tons	286,216	4,716,857
		14,842,507
Less value Ontario iron ore (120,177 tons) smelted into pig iron		282,702
		$14,559,805

NON-METALLIC.

Arsenic, tons	3,712	$ 2,782
Brick (common) No.....	273,882,000	2,108,891
Tile (drain), No.....	15,500,000	248,000
Brick (pressed) No.....	69,763,423	648,683
Brick (paving) No..... ...	3,732,220	73,270
Building and crushed stone, tons		675,000
Calcium carbide, tons	2,667	173,763
Cement, Portland, bbls...	1,616,692	2,718,278
Cement, natural rock, bbls...	7,239	5,097
Corundum, tons	60,532	242,608
Feldspar, tons	12,328	30,375
Graphite, tons	2,000	20,000
Gypsum, tons	10,186	19,652
Iron pyrites, tons	15,755	51,842
Lime, bush.....	2,649,143	423,863
Mica, tons	456	82,929
Natural gas		756,174
Peat, tons	200	1,040
Petroleum, Imp. galls...	27,621,851	1,049,631
Pottery		54,585
Quartz, tons	56,585	124,148
Salt, tons	48,735	379,771
Sewer pipe		242,588
Talc, tons	1,879	5,010
		10,137,970
Add metallic production		14,559,805
		$24,697,775

DOMINION COAL OUTPUTS FOR FEBRUARY, 1908.

	Tons.
No. 1	42,466
No. 2	60,049
No. 3	30,137
No. 4	26,358
No. 5	47,427
No. 6	17,873
No. 7	6,286
No. 8	12,840
No. 9	28,758
No. 10	11,364
	284,458

BRITISH COLUMBIA SHIPMENTS.

Following are the shipments for the week ending February 22nd and year to date:—

	Week.	Year.
Boundary shipments	17,514	123,048
Rossland shipments	4,958	43,875
Slocan-Kootenay shipments	2,725	20,953

The total shipments for the past week were 25,197, and for the year to date 187,876 tons.

Nelson, Feb. 29.—The total shipments from Boundary and Kootenay mines for the past week were 30,186 tons, the largest for the present year so far. The total for the year to date is 218,502 tons. The various districts produced as under:—

	Week.	Year.
Boundary	22,960	146,398
Rossland	4,924	48,799
East of Columbia river	2,302	23,305

Receipts af the various smelters were as follows:—Granby, week, 22,919; year, 145,967. Trail, week, 4,807; year, 45,438. Le Roi, week, 1,378; year, 14,790. Sullivan, week 675; year, 5,730. Total, week, 29,779; year, 211,925.

The output of the collieries of the Crow's Nest Pass Coal Company during the fourth week in February, for four years, compares as follows:

	Tons.	Daily aver.
1908	22,776	3,796
1907	22,262	3,710
1906	19,769	3,295
1905	18,113	3,019

	Week ending Mar. 7. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	301,100
Coniagas	61,880	260,870
Cobalt Lake	.....	115,700
City Cobalt	.....	101,010
Drummond	.....	92,340
Foster	.....	168,600
Kerr Lake	61,700	144,290
King Edward	.....	127,240
La Rose	90,190	370,332
McKinley	.....	506,420
Nipissing	127,710	693,940
Nova Scotia	40,000	80,799
O'Brien	65,100	957,350
Standard	.....	39,730
Silver Queen	53,700	296,700
Silver Cliff	.....	52,000
Silver Leaf	.....	62,000
Townsite	.....	45,100
Temiskaming	.....	115,650
Temiskaming & H. B.	60,000	318,000
Trethewey	.....	177,116
Watts	.....	61,700

The total shipments for the week were 561,280 pounds, or 280 tons. The total shipments from January 1st to date, are 5,511,988 pounds, or 2,755 tons. The total shipments for the year 1907, were 28,081,010 pounds, or 14,040 tons. In 1904 the camp produced 158 tons, valued at $136,217; in 1905, 2,144 tons, valued at $1,473,196; in 1906, 5,129 tons, valued at $3,900,000.

The output of the Crow's Nest Pass collieries for the week ending March 6th, compares with the same week in previous years, as follows:—

	Week's output.	Daily average.
1908	20,075	3,346
1907	22,485	3,749
1906	19,429	3,328
1905	18,830	2,356

Following are the weekly shipments from Cobalt camp, and those from January 1st to date:—

Gold production of the Transvaal mines last month, estimated by Kaffir houses in London, was 550,00 ounces, fine, comparing with 560,329 ounces officially reported for January. February had two working days less than the month before.

Value of the February output, calculated on the basis of the above estimate, compares as follows:—

February, 1908	$11,687,000
January, 1908	11,900,000
December, 1907	12,393,000
November, 1907	11,677,000
September, 1907	11,427,000
February, 1907	10,482,000
February, 1906	8,658,000
February, 1905	7,726,000
February, 1904	6,149,000
February, 1903	4,174,000
February, 1902	2,728,000

MARKET NOTES.

Canadian Pig Iron.—For pig iron there is very fair enquiry, with the two largest Canadian producers reported as doing some cutting, and prices tend easiness. Domestic brands are quoted at about $20, best grades of Scotch at $22 to $22.25, for Spring delivery, and No. 3 English, at about $18.

The Londonderry furnace is blown out, owing to some difficulty over the coke supply. Domestic bars are easy at $1.90, and there appears to be some lack of firmness in general iron products.

Silver.—February 20th, 56 1-4; February 21st, 55 7-8; February 24th, 55 5-8; February 25th, 55 7-8; February 26th, 55 5-8; February 27th, 55 1-4; February 28th, 55 1-4; February 29th, 55 3-8; March 2nd, 55 7-8; March 3rd, 55 3-8; March 4th, 55 1-4.

At a meeting of the McKinley-Darragh-Savage Mines of Cobalt, Limited, held in Toronto March 5th, a new board of directors was appointed, as follows:—

H. W. Sibley, Thomas Finucane, Joseph S. Hunn, and W. L. Thompson, of Rochester; C. A. Masten, Toronto; E. W. Stratman and L. J. Angevine, of New York.

Mr. Masten declined the office of the presidency in the absence in Europe of Mr. F. B. Chapin, who at present holds the office

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The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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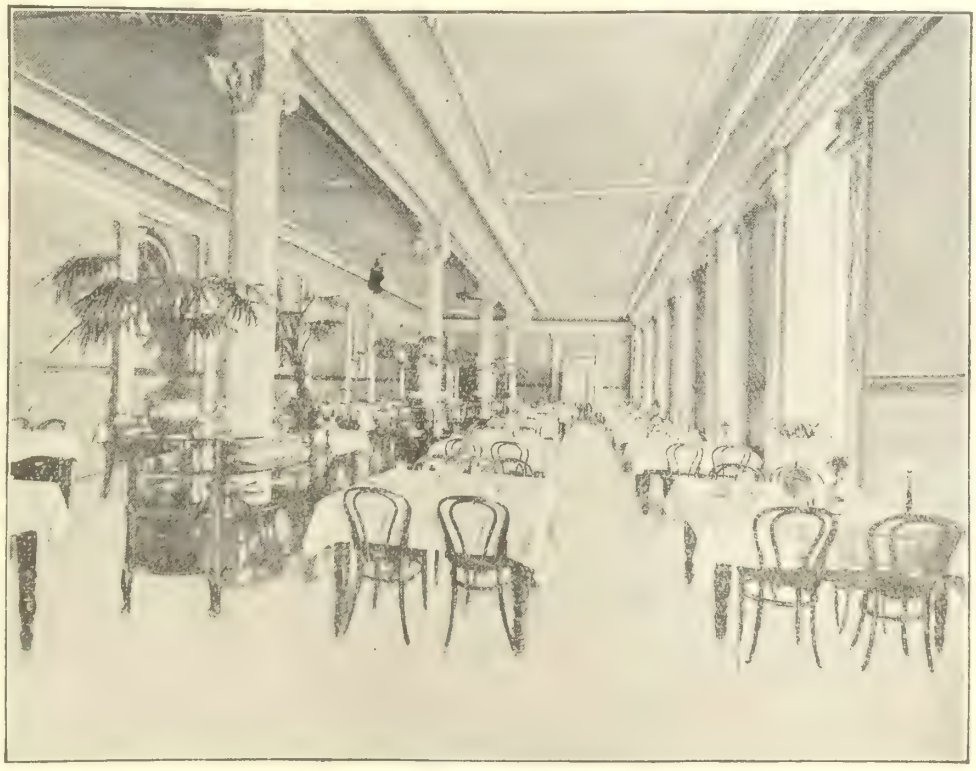
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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

Unbeatable Value in a Fancy Worsted Suit

THE MATERIAL

M.J. 100 An imported Worsted made in England. After looking through all the samples of the largest English manufacturers, we choose this fabric as THE ONE most likely to appeal to the average Canadian of good taste. The Worsted is closely woven and smooth in finish. The predominant colors are black and grey, with a faint suggestion of blue in the background. Note also the subdued over-plaid.



Sizes 35 to 44

STYLE AND MAKING

Without going to any extremes, the style embodies the best ideas brought out by the best makers of men's clothes for 1908. The smart single-breasted effect shown in the cut is an exact representation of it The suit is lined with a mohair twilled serge and is stayed throughout with linen. The coat fronts and shoulders are reinforced with shrunk linen duck and haircloth. The whole suit is sewn with silk and most carefully tailored by expert workmen.

THE PRICE

The tremendous purchase we made of this fabric brought the price down to such an extent that we can make this suit and deliver it to you for about two-thirds of what it would cost you to get it any other way. The price is **$10.50**

Men's "Victor" Boots



M. J. 101. Style V. P. Men's "Victor" Boots, patent colt of selected quality, dull matt calf Blucher tops; pointed, medium and broad toes; all sizes 5 to 10, ; B, C, and D widths..... **$4.00**

Two Sweater Specials



M. J. 102. Men's Hand-Knit pure wool jackets, two pockets, pearl buttons, made in all plain colors, and all club and college colors, collar can be turned up or worn as in cut, sizes 34 to 44. Worth $7.00 each **$5.25**



M.J. 103. Men's hand-knit pure wool sweaters, deep [illegible] of V shaped neck, can be worn to any [illegible] sizes 34 to 44. [illegible] sweater [illegible] by expected at [illegible] each **$2.00**

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TORONTO, CANADA

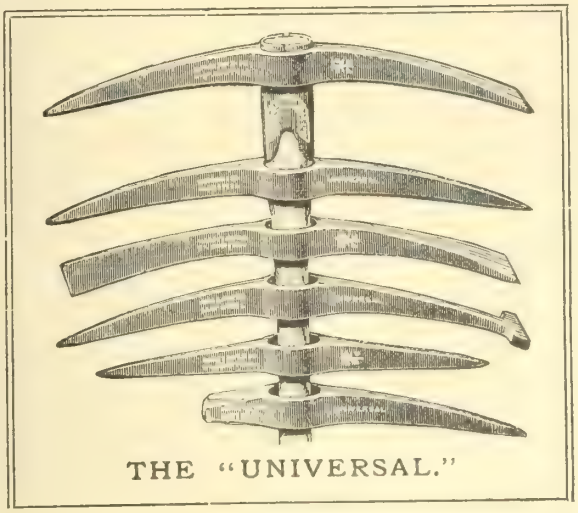
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"Universal" Picks

They Cut More Coal in Less Time Than Any Others and Last Longer

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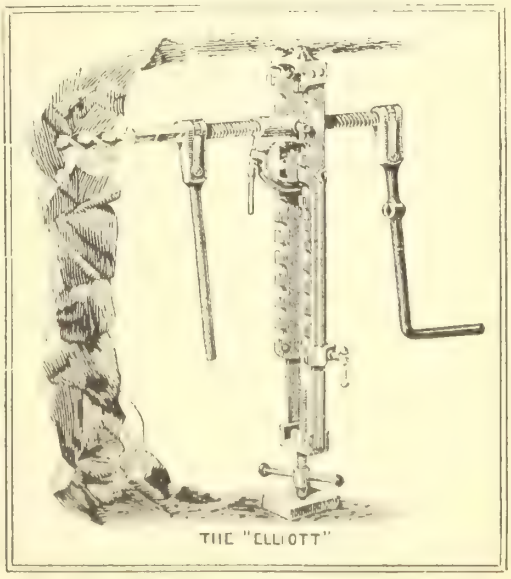
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For **Hand Power**, for **Rock** and **Coal**

Fitted with Quick-Change Nuts and Automatic Feed



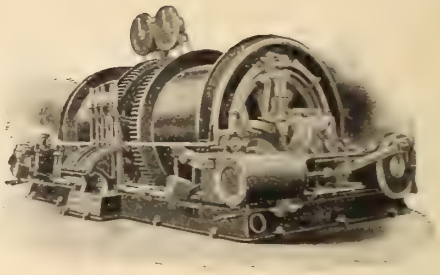
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For Collieries, Mines, Aerial Tramways

Transmission of Power, Logging and general Hauling and Hoisting Purposes.
Wire specially selected for own exclusive use.
We have made many records with our Winding, Haulage and Crane Ropes.

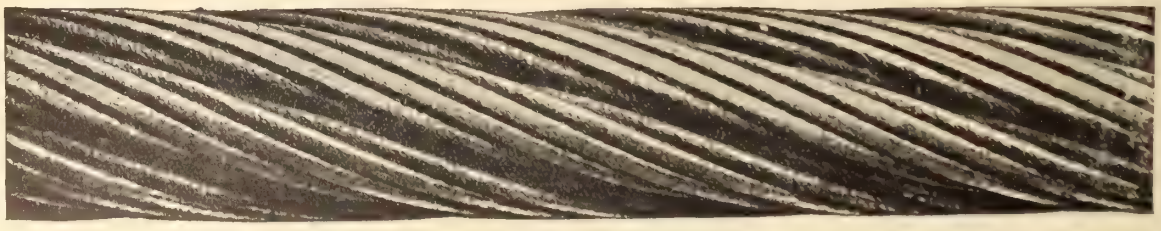


Illustration of **Winding Rope,** 240 fms. long x 3½ circ. Galvanized Special Improved Patent Steel, Compound Make, supplied to Kinneil Collieries, Bo'ness, Scot., which gave a record life of 6 years and 2 months. Showing condition when taken off.

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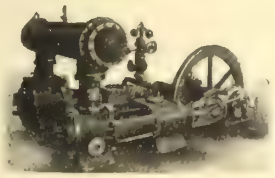
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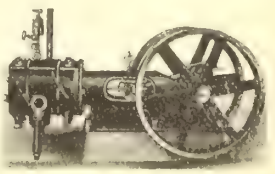
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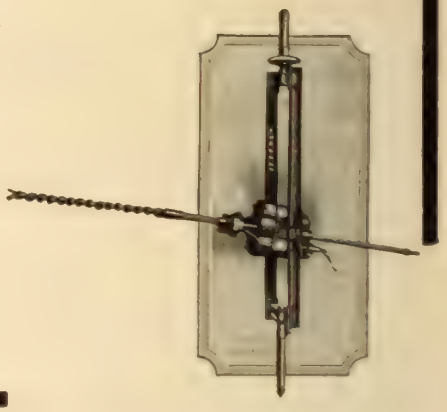
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The use of Sullivan Class "D-21" Hammer Drills for upper holes shows large economy in mining cost.

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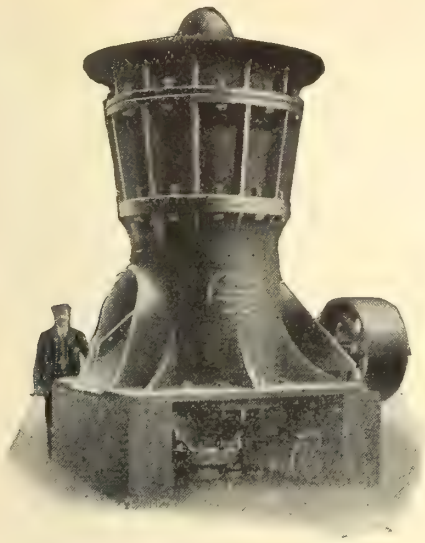
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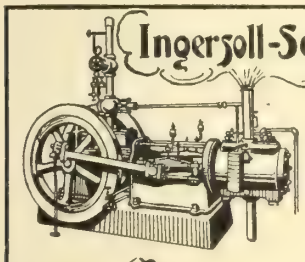
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Including
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ENGINEERS AND BUILDERS OF **STRUCTURAL STEEL WORK**

5000 Tons of Steel in Stock **Annual Capacity 15,000 Tons**

Beams, Angles, Channels, Plates, Etc.

Any Size from 1½ Inch to 24 Inches, and any Length up to 70 Feet

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Highest Grade of Hoisting Rope Made. Extra Tensile Strength for Heavy Work.
Use Greening's Rope Grease for Lubrication.

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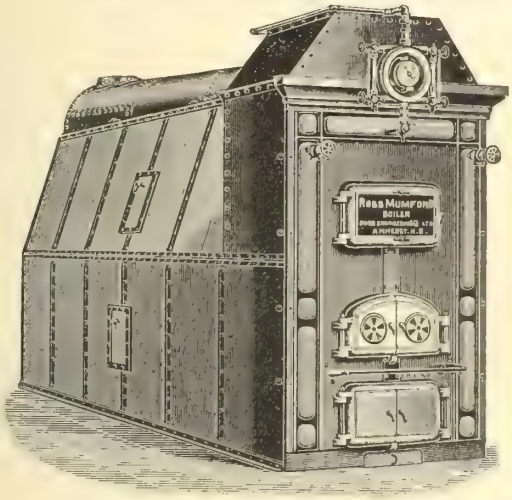
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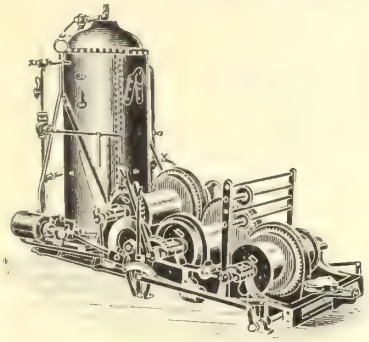
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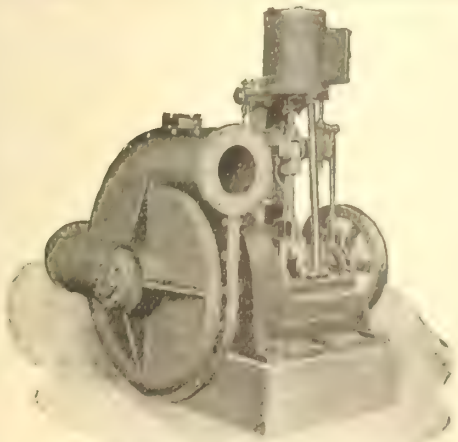
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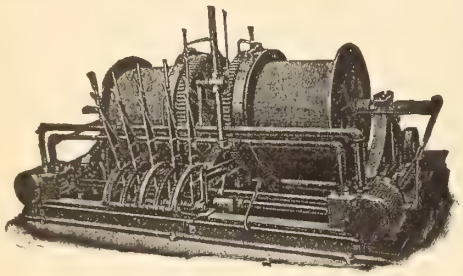
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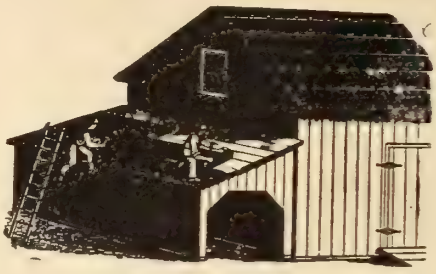


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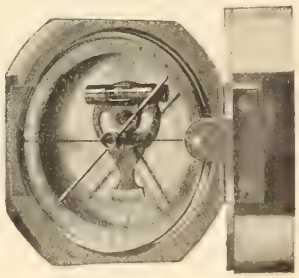
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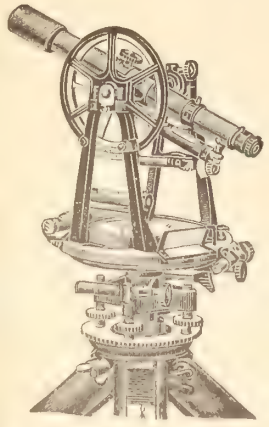
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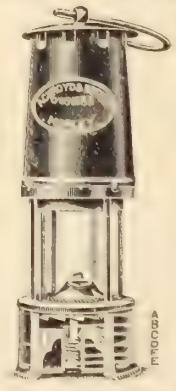
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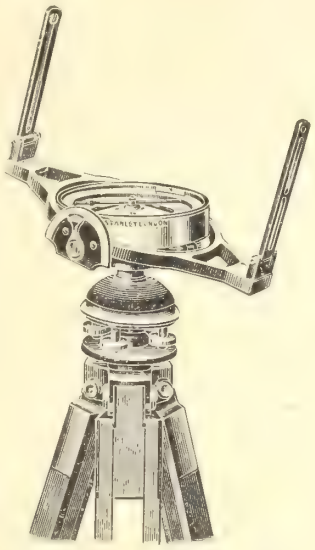
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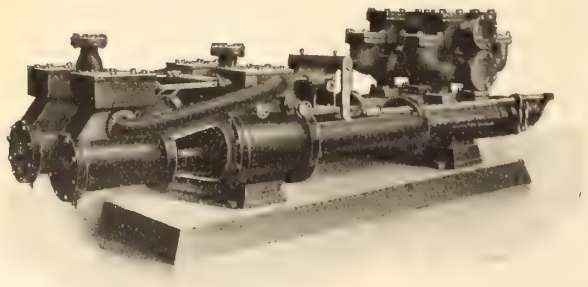
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VOL. XXIX. TORONTO and MONTREAL, April 1, 1908 No. 7

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of THE CANADIAN MINING JOURNAL were printed and distributed, or an average of 3,822 per issue.

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NOVA SCOTIA'S MINERAL OUTPUT.

The official returns of Nova Scotia's mineral output, given in full on another page of this issue, appeared early in March. The report of the Mines Department will be given fuller notice at a later date. Meanwhile it is timely to notice again the causes that led to the serious decrease in the output of coal. Whilst the Pictou and Inverness collieries increased their annual production by substantial amounts, the Springhill strike almost counterbalanced this gain.

In Cape Breton, owing to the Hub colliery fire, and the unusually late opening of the shipping season, the production was cut down by the serious amount of 175,191 tons.

However, this diminution of output must be looked upon as purely fortuitous. It is hardly probable that the opening of navigation will be delayed again to such an extent as it was last spring. It is also to be hoped that labor troubles will become things of the past. The settlement effects between the Dominion Coal Company and its employees is a guarantee of peace so far as Nova Scotia's largest coal producer is concerned. Hence we may look forward with well-founded hope to a shipping season of unexampled activity.

The Provincial authorities had estimated that they would receive for the past year $725,000 in coal royalties. Events proved that this estimate, for the reasons adduced above, was excessive. In fact the actual amount received was $633,933, or $10,000 less than the revenue for 1906.

It is true, however, that the same causes that, had conditions been normal, would have brought about a large increase of tonnage last year, will again be operative this year. The St. Lawrence trade undoubtedly will be brisker during the approaching season. The local demand is growing heavier and the coast trade with the United States increases yearly. With an open spring and industrial peace Nova Scotia should therefore count upon a larger coal output this summer than in any preceding year.

Incidentally we notice in the Provincial Financial Returns the item of $14,851.17 for miners' relief funds. We mention this because it is our intention to discuss this item fully at a later date.

The tabulated statistics for the year ending September 30th, 1907, include several items, such as antimony ore, cement, bricks, copper, building stone, etc., not before specified in the annual returns.

BEGINNING A UNIVERSITY.

In presenting the University Bill before the British Columbia Legislature, the Hon. Dr. Young remarked that it was not the intention of the Government to decide immediately upon a site for the proposed buildings. The first efforts would be confined to establishing preparatory classes throughout the Province. By this means the germs of practical higher education will be implanted in a large number of young men and the best possible foundation laid for the University.

BRITISH AGITATION AGAINST THE EIGHT HOUR BILL.

Speaking before Mr. Herbert Gladstone, a representative of the British Iron Trade Association outlined the probable effects of the proposed shortening of the hours of labor. Conditions in South Staffordshire were principally referred to. At present the miners start to go down into the mines at 7 a.m. They are allowed a maximum of one hour for meals. Contract men seldom take more than half an hour. Between 7 a.m. and 4 p.m. the output for one gang of contract men is 22 tons or 40 tubs. If the day is reduced to 8 hours the output will be diminished by 9 tubs. The colliers go down in the owners' time and come up in their own time.

In addition to increasing the cost per ton of coal raised the effect upon the iron and steel industry would be marked. It is claimed that in the Tipton district 27 tons of water must be raised for every ton of coal. Decreasing the output by shortening the hours of labor will have the effect of increasing the relative amount of water pumped per ton of coal won to between 32 and 35 tons. This, it is stated, would be ruinous.

The collieries spoken of are owned and operated by manufacturers of iron and steel. Therefore their representative speaks with some degree of authority when he asserts that six shillings per ton will be added to the cost of manufacture of finished iron and steel.

In the foregoing paragraph is contained the essence of the whole matter. Labor unions, by complete organization, have attained a solidarity and, consequently, a political influence that gives their contentions tremendous weight. These contentions are so impressed upon the politicians and statesmen of the day that the claims of the employer are either overlooked or considered as the protests of class selfishness.

Time was when labor and capital were justly looked upon as the two eternal protagonists of our body politic. This conception to-day should be obsolete. The interests of both employers and labor are closely conjoined and are inextricably interwoven with those of every other class. Unreasonable concessions to either side may sometimes appear expedient, but will always be unprofitable and costly in the long run. In Great Britain the predominating tendency is to concede everything to the unions. In Canada, whilst by no means so pronounced, this tendency exists. Legislation, such as the Lemieux Act, is the best corrective that modern statesmanship has devised.

Canadian employers and employees should watch closely the trend of events in Great Britain.

THE HAMMER DRILL.

The air hammer drill is coming into prominence. Whilst it will not replace the reciprocating drill, yet its sphere of usefulness is larger than in commonly believed. The increasing number of types manufactured give it a wider application. Under certain conditions of shaft sinking the hammer drill is undeniably economical. For cutting hitches it is an essential if cheap work is to be obtained. But its limitations for drifting, stoping and cross-cutting have not yet been demonstrated.

In our Special Correspondence columns we give some valuable figures from an actual test.

THE PORT HOOD DISASTER REPORT.

The report upon the recent explosion in the Port Hood-Richmond Coal & Railway Company's colliery, handed in by a committee appointed by the Provincial Government, is not, in some important respects, in accord with the bulk of the evidence adduced. The report itself is reprinted in full in our news columns.

We have before us the evidence taken at Port Hood. Whilst we cannot now enter into a full discussion of this evidence, yet it appears to us that the facts, such as they are, point to an explosion of powder and not of gas. Our readers will have an opportunity later on of deciding the matter for themselves.

Meanwhile we cannot do beter than quote from the last letter of our Glace Bay correspondent, who refers as follows to the present system of coal mine inspection in Nova Scotia:

"There is one matter which is suggested by the eighth clause of Dr. Kendall's resolution, 'the enforcement of laws intended to lessen or prevent accidents,' and that is the personnel of the mines inspectorate of Nova Scotia. One of the facts that can be ascertained is that nothing will so tend to the prevention of accidents and the preservation of life and property as the existence of a vigilant and capable inspectorate. The men who compose the present force of inspectors are good men, we have no doubt, but they were not appointed by competitive examination, and we do not think that any of them are men with a college training.

"The Inspector of Mines should be a man of considerable scientific attainments and extensive knowledge of modern mining methods, in addition to having a thorough grasp of practical mining and all that appertains to it. He should be a man that can advise and direct in

case of emergency and danger, and a man whose advice could be sought and relied upon as proceeding out of a well trained experience added to scientific knowledge. No inspector should be appointed for political purposes, and 'we consider the time has arrived' when no man should be appointed to an inspectorship because of his political preferences, or as a reward of political loyalty. He should be appointed because his qualifications mark him out as fitted for such an onerous and responsible position. To-day when mines are at work in Nova Scotia with 1,500 persons below, in one mine, at one time, whose lives may be endangered by the ignorance or the stupidity of one man, we require inspectors who can enforce regulations, and explain why they enforce them. The Government of Nova Scotia should have a Chief Inspector of Mines, whose scientific and technical attainments should be beyond reproach. This man should appoint his assistants by rigid competitive provincial examination, such as would entirely eliminate the incompetent and raise the status of the inspectorate. Men of this calibre would need and could not be obtained without the payment of adequate salaries, but in return we would get adequate men, and it would open up an avenue of promotion for the young and ambitious mining students of the province. The Inspector of Mines should bear the same relation to the colliery manager that the colliery manager bears to his overmen, and the correspondingly more difficult than the colliery manager examination.

"As conditions are now, the managers and salaried officials of the coal corporations are man whose wide range of experience and technical knowledge, obtained by years of hard study, make them infinitely better able to advise the inspectors than the inspectors are to advise them, which is a reversal of the correct state of affairs. We think it will be found that most of the recent improvements in Cape Breton mining as regards safety —and they are many—have been carried out on the sole initiative of the officials of the coal corporations, who constitute the only body of mining experts in the province."

CONCENTRATION OF COBALT ORES.

We commend to the earnest attention of our readers an article appearing in this issue of The Canadian Mining Journal. The writer, Mr. G. H. Gillespie, has been afforded especial facilities for the study of the subject of Cobalt ore treatment. This article will be followed by others that will deal more fully with details.

Mr. Gillespie's point of view strikes us as being sane and clear. It is true that Cobalt ores present some peculiar difficulties. But most of these difficulties have been overcome in other camps. On the other hand Cobalt has exceptionally favorable conditions. Transportation is good. Labor is plentiful, and supplies are becoming cheaper.

Stress must be laid upon the fact that there is a strict limit both to the amount and to the varieties of ores that can be concentrated with commercial success. For instance, hand-sorting can in some cases be carried on to a much larger extent than now obtains. It is wasteful to put the whole run of mine through the mill. Again, with light stoping drills and narrower stopes the tenor of the ore may be considerably improved. Every pound of unnecessary waste rock handled means a multiplied waste of power, time and money.

We agree fully with the opinion that it is wise to begin with as simple an equipment as possible.

In most of the mines of Cobalt hand sorting of No. 1 ore plays a large part. So far as practicable then this ore should be separated in the initial stages, before and after crushing.

If a stamp mill is to be part of the equipment, the design and practice will be modified by several considerations. It is probable that heavy stamps, dropping between 90 and 110, twenty-mesh screens, low rapid discharge and a light feed will be the salient features developed as experience is gathered. Possibly concentrating tables and slime tables will meet all requirements after this, although it is likely that the average tailings will respond profitably to cyanidation.

We do not believe in a multiplicity of stages. Classifying can often be done most profitably in the mine and on the sorting tables. When classification becomes complicated, profits become correspondingly uncertain.

It is dangerous to dogmatize, however. Simplicity may be an unattainable ideal. But a tendency in the direction of that ideal is healthy.

THE PRICE OF SILVER.

In the year 1868 silver brought $1.326 per ounce. From that year until 1889 there was a slow thought constant recession in price, until in 1889 the figure of $0.935 was reached. Low water mark was touched in 1902, when $0.522 was the average price for the year. For 1907 the average was $0.653.

The world's output of silver in 1900 exceeded that of any previous or succeeding year — 173,591,364 ounces were then produced.

Since 1904 Canada's silver output has gone up in value from $2,075,000 to, roughly, $7,500,000.

A new safeguard for collieries is offered by the discovery of Profs. Elster and Geital that firedamp contains six or seven times as much radium emanation as the ordinary air of coal mines. An aluminum foil electroscope quickly shows the difference of electrical conductivity due to the emanation, and this simple apparatus becomes an effective and important means of detecting danger.

THE MECHANICAL EQUIPMENT OF THE OTTAWA MINT.

(A paper read before the Mechanical Section of the Canadian Society of Civil Engineers.)

By A. H. W. Cleave.

The mechanical equipment of this branch of the Royal Mint was completed by the end of October last—the time occupied in the manufacture and installation of the necessary machinery having been just ten months.

Many machines in the Coining Department have been designed specially for the Ottawa Mint, and in these new devices have been adopted, which are not to found in other similar institutions. In addition to the machinery in that department, where the actual minting of money takes place, the following plants have also been installed:—

(1) The Electrical Plant, for power distribution, for lighting, etc.

(2) The Oil-fuel Plant, for storing and distributing the oil-fuel used throughout the various departments in the melting, annealing, and cupel furnaces, together with the fans and blowers for the same.

(3) The Die-making Plant, for sinking, turning, annealing and hardening the dies used for coinage purposes.

(4) The Plant for the Boiler House and the Machine, Smith's and Carpenter's Shops, in which all running repairs are effected and small tools made.

(5) The Plant for the Assay Department, where all the precious metals received into and issued from the Mint are analysed; and in which experimental research work will be conducted.

To give a full and complete description of all the mechanical devices which have been installed throughout the Mint would make this paper unduly long. Each of the plants enumerated above will therefore be briefly dealt with in turn, in the order given; and then the Coining Department, which contains types of machines probably less commonly known than the rest, will be described more at length.

Electrical Plant.

Electrical Equipment.—The electricity used for power and lighting is supplied in the form of a two-phase, alternating current, and enters the building at a potential of 2,140 volts. It then passes through the transformers, of which there are three for power and three for light. In each case one is a spare, which can be put into circuit, on either phase, by operating the primary and secondary switches.

The transformers for power operate the motor of a motor-generator set. They are single phase, step down, oil insulated, self cooled, for a circuit of 60 cycles. The primaries are wound for a potential of 2,140 volts, and the secondaries for a potential of 500 volts. Their normal full rating is 100 kilowatts each.

The transformers for light operate the electric light system of the building. They are similar to the transformers for power, but the secondaries are wound for a potential of 107-214 volts; while their normal full rating is 15 kilowatts. The primaries and secondaries of each transformer are provided with binding posts, so that any one of them may be conected or disconnected without soldering to leads, or cutting wires.

The motor-generator set for transforming the current to operate the motors throughout the Mint consists of an alternating current motor and continuous current generator. The motor is of the two-phase, alternating current, induction type, operating from the transformers at a potential of 500 volts; its normal full rating being 225 H.P., at a speed of about 800 revolutions per minute. The generator is multi-polar, compound wound, continuous current, operating at a potential of 225 volts; its normal ful lrating being 150 kilowatts. The motor and generator are on one bed plate, and supplied with auto-starter for the motor, and field rheostat for the generator.

There are 32 compound wound, continuous current motors in use, ranging in power from 1 1-4 H. P. to 30 H. P., all operated at a potential of 220 volts.

The wiring for the motors is of the parallel two-wire system, the wires being carried in steel conduits.

The wiring for the lighting is of the interior conduit system; all the main circuits being of three wires, and the branch circuits of two wires.

There are 415, 3.5 watt, 16 C. P. 102-volt incandescent lamps, and 17 arc lamps. The latter are of the enclosed type for multiple circuits, adjusted for 7 amperes and 107 volts, alternating current.

The buildings are wired for electric clocks, bells and telephones, which are in use throughout the Mint.

Oil Fuel Plant.

Oil Fuel Equipment.—The fuel used for melting and annealing purposes, and for the cupel furnaces in the Assay Department, is crude oil; its specific gravity being .850. The plant for storing, distributing and burning this fuel consists of:—Four storage tanks (each of 2,000 gallons capacity), two rotary pumps for distributing the oil throughout the buildings, three pressure blowers, four melting furnaces for crucibles holding 90 pounds each, one strip annealing furnace, one blank annealing furnace, one die hardening furnace, and three cupel furnaces and two small melting furnaces for the Assay Department. In melting and cupel furnaces an air blast is used in conjunction with the oil; while in the annealing furnaces and die hardening furnace dry steam is used, at a pressure of 60 pounds per square inch. The oil pumps are so arranged that the fuel is delivered to the furnace at constant pressure. All oil pumped, but not used, is returned through a spring-loaded valve to the storage tanks.

The tanks are supported on concrete bearers, one at either end, and one at the centre of each tank, so that the air may circulate freely around them. The piping for these tanks is so arranged that each one may be filled or emptied separately. Each tank is also fitted with a return pipe from the pumps, and a vent pipe through which all fumes rising from the oil are lead to the roof of the building. The air for the blast used in the melting furnaces is drawn from the tank room, so that the air round the tanks is constantly changed.

This fuel is found to be very economical, and excellent results have been obtained from all the furnaces. The heat can be regulated without difficulty, and, in the

melting furnaces, either nickel or aluminium may readily be melted.

Die Making Plant.

Die Department.—The machinery in this department consists of a die sinking press, two die turning lathes, and a die hardening furnace. The press and lathes are driven by a motor through an overhead shaft. In the die press the blow is given by a heavy fly wheel, 5 feet in diameter, which is keyed to a triple screw of 6 inches diameter. The fly wheel is actuated by two rapidly revolving discs, which can be brought into contact with its leather covered rim. One friction disc raises, and the other depresses the screw. The operator works the press by depressing a stirrup rod with his right foot. This action brings one of the friction discs into contact with the rim of the fly wheel, and thus the required blow is given to the die. On the operator withdrawing his foot, a balance weight raises the stirrup, the other friction disc comes into operation, and the screw is raised. After the blow has been delivered, the height to which the screw shall rise is regulated by a brake adjustment; and having reached that height, it remains there until the stirrup is again depressed. In this press a blow may be given varying from a few pounds to about forty tons.

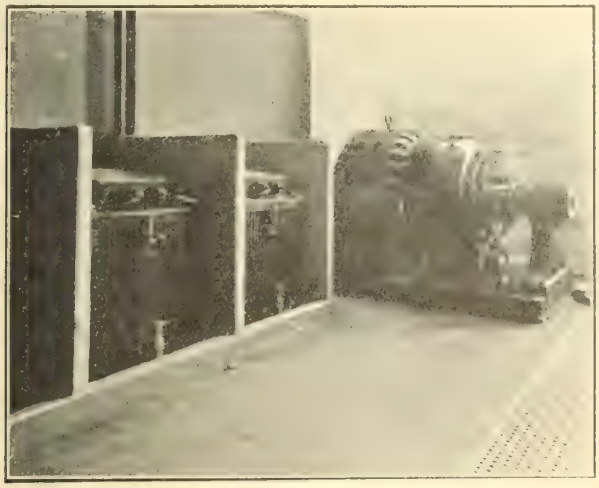


Fig. 1—Motor-generator set and power transformers.

Each coinage die requires three blows from the punch before the impression received is sufficiently sharp in all its details. After each of the first two blows the die is annealed in the die furnace. After the third blow it is turned to the correct size, and then hardened and tempered; after which it is ready for use in the coining press. It is usual for a pair of dies to strike about 80,000 pieces before they are unfitted for further use.

Machine Shop.

Repair Shops, etc.—In the machine shop the following tools have been installed:—

One 14-inch by 72-inch Norton roll grinding machine.

One Brown & Sharpe, No. 13, universal grinding machine.

One Brown & Sharpe, No. 2, milling machine.

One Bertram planing machine.

One Barnes 21-inch drilling machine.

One sensitive drill.

One 16-inch gap lathe.

One 14-inch, Pratt & Whitney lathe.

One shaping machine.

One polishing spindle.

In addition to the above, fitters' benches, grindstone, power hacksaw, etc., have been installed.

The roll grinder and the planer are driven by their own motors, while the other machines are grouped.

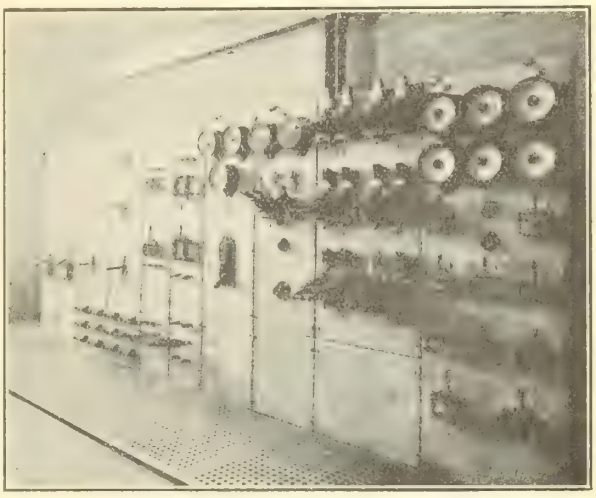


Fig. 2—Main switchboard in power room.

An elevator is situated in one corner of the shop, communicating with the smith's shop, which is in the basement next to the boiler room.

The smith's shop contains a Buffalo down draft forge, a Fairbanks' 100-pound power hammer, shearing machine, etc.

The boiler room is equipped with two marine type multitubular boilers, which are used for heating the Operative Department, by steam, during the cold weather; for supplying hot water throughout the buildings; and for supplying steam to the annealing and die furnaces, and to the drying apparatus. Hard coal is used in these boilers, and a pressure of 80 pounds per

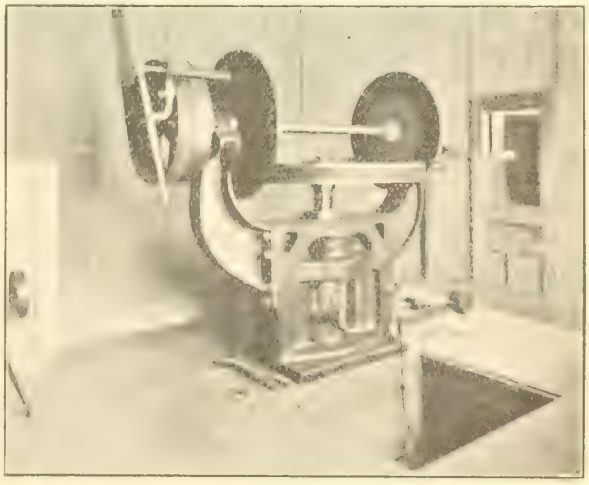


Fig. 3—Die making press in Die Department.

square inch is maintained. The boilers are fitted with connections so that either, or both, may be used for any of the above services. The steam for heating the building, before entering that system, passes through a reducing valve, so that the pressure is reduced to 10 pounds per square inch. The returns from the heating

system are lead to a hot well, and are returned to the boilers by a duplex feed pump. The boilers may also be fed by means of a Pemberthy injector, or direct from the mains, in case of necessity, and when the steam pressure is below 40 pounds per square inch.

The carpenter's shop is in the basement, next to the smith's shop, and contains a variety saw, a 12-inch wood

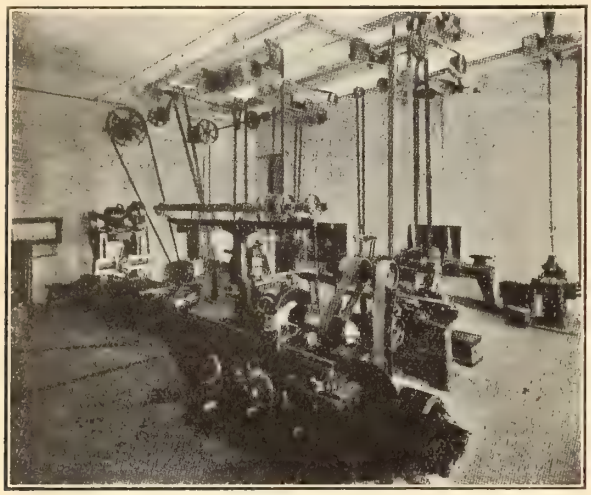


Fig. 4—Machine Shop.

turning lathe, and a carpenter's bench. The saw and the lathe are driven from an overhead shaft by a motor, which also drives the shafting for the blacksmith's shop.

Assaying Plant.

The Assay Department.—This department is situated in the front building, and occupies three floors. In the basement the motors and blowers for the furnaces are installed, and here also are stored the acids, chemicals, etc. The furnace room is on the ground floor, and contains three cupel and two melting furnaces; all heated by oil fuel in conjunction with an air blast. The second floor is occupied by the laboratory and scale rooms.

In this department is an elevator, communicating with all three floors, which may be used either for passengers or for the conveyance of apparatus, acids, etc., to the various rooms. Additional communication between the three floors has also been provided, in the form of a spiral stairway. Fume chambers have been installed in the laboratory and furnace room, together with the necessary chemical and physical apparatus for assay and experimental work.

The Coining Department.

For the purpose of describing the machines used in the actual processes of minting, it may perhaps prove interesting, and more intelligible, if the various operations through which the metals pass while being transformed from ingots into finished coins, are stated in order of sequence, and then are dealt with separately. A short description of each machine and the part it takes in the production of the coins will in each case be given.

The operations are as follows:—Melting, rolling, adjusting, cutting, marking, annealing, blanching and cleaning, coining, testing.

Melting.—The ingots (of a purity of 999 parts per 1,000, or over) are placed with the necessary alloy in the crucibles, and charged into the melting furnaces. There are four of these furnaces altogether, each one taking a No. 30-35 crucible (about 90-110 pounds of silver). Crude oil is used as fuel, in conjunction with an air blast. The oil (sp. gr. 32-34 B.) is delivered to the furnaces in very fine streams at a pressure of about 25 pounds per square inch, and is mixed with air from a low pressure blower (air blast about 10 ounces per square inch).

The flame does not play directly on the crucible, but first strikes a fire brick, and is then deflected so as to travel round the crucible, and then to the flue.

These furnaces are very clean, economical and easy of manipulation. It is usual, in the case of silver, and starting with a cold furnace, for the first round to be ready for pouring one and a half hours after lighting up. After the first round has been poured the furnaces have become thoroughly warmed up, and the subsequent rounds are ready for pouring one hour after charging in. It will thus be seen that in an ordinary working day of eight hours, metal can be poured six times from each furnace.

The flues are so arranged that the gases issuing from the furnaces enter a large condensing chamber, where they expand rapidly, and their velocity is reduced. In passing through these chambers the gases strike against baffle-plates (the course taken by them being in the form of the letter S placed on its side), by means of which their velocity is still further reduced. Any fine particles of metal which may be carried by them from the furnaces are deposited on the baffle-plates and sides of the chambers, and are thus prevented from being carried away through the chimney stack.

This treatment of the gases results in the saving of a considerable amount of metal, as is clearly shown in the annual report of the Director of the United States Mint. From this report it appears that, after six months' working, the value of the metals recovered from the condensing chambers attached to 13 furnaces, was no less than $12,900.00.

After the metal has been melted, it is poured into cast iron moulds, forming bars about 24 inches lon 1-2 inch thick, and varying in width fro 1 1-4 inches, according to the denomination of coin to be made. The



Fig. 5—Boiler House and Smith's Shop, showing two marine type high pressure boilers, power hammer, shearing machine and Buffalo down draught forge.

newly formed bars are removed from the moulds as soon as they have become solid, and plunged in a weak solution of sulphuric acid; after which they are washed and dried. They are then taken to the shearing machine and revolving files, where the spongy ends are removed,

and the rough edges trimmed. They are then ready for the rolilng mills.

The shearing machine is of the usual single ended pattern, such as used in machine shops, fitted with fast and loose pulleys, and driven from an overhead shaft.

There are two revolving files, each consisting of a headstock, with shaft, and single pulley between the bearings. On one end of the shaft, outside the bearing, is keyed a circular file of about 6 inches diameter and 6 inches long. These files are also driven from the same overhead shaft as the shearing machine, and revolve at 150 revolutions per minute. The bars from each crucible are kept separate from those from any other crucible, and are marked with distinctive letters and figures, so that their origin can be readily traced at any time. A small piece is cut from one end of the first and last bar from each crucible, and these pieces are forwarded to the Assay Department for testing purposes. The bars are not operated upon until the report from that department has been received, stating that they are within the legal remedy as to fineness. All bars which are above or below the legal standard are re-melted with the necessary amount of alloy, or fine metal, to bring them within the remedy.

All the worn out crucibles, covers, etc., are ground to a fine powder in a mortar mill; the powder being washed, so as to recover any metal that may have been taken up during the process of melting.

The powder is washed twice, after which it is sold by public tender, the tendering firms being allowed to take samples beforehand.

The mortar mill used for reducing the worn out crucibles, etc., is fitted with an under-driven revolving pan, five feet in diameter, has fast and loose pulleys, and is driven from an overhead shaft by a 5 H.P. motor. After the powder has been washed, it is dried in a steam-heated drying pan, 8 feet long, 4 feet wide, and 10 inches deep. It is then thrown into bins, where it is stored until sold.

(To be Continued.)

CONCENTRATING COBALT ORES.

G. H. GILLESPIE, M.E.

The problem of concentrating the ores of Cobalt is a complex one. It is, however, a problem that can hardly be considered entirely new. Every mining camp has its own peculiar features, which can only be worked out by experiment and by practical operation on a small scale. It is better, therefore, in adapting the principles of concentration to new ores to begin the practical application on a small scale and with a limited outlay of capital. The main aim, from the business point of view, in placing a concentrating mill in operation on a mine is, therefore, the treatment of low grade ores in a plant that is the most commercially efficient and that has been erected at the smallest initial outlay of capital.

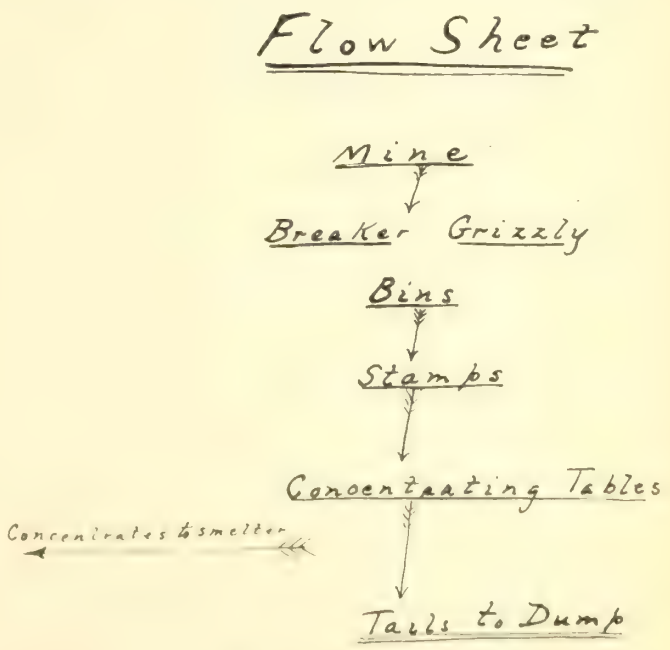
It must always be remembered that the capital outlay on a mill must be written off against the quantity of ore available for treatment during the lifetime of the mine. Therefore, the plant, which by large initial outlay of capital, gains in theoretical efficiency of extraction over a less costly plant, should that initial capital expenditure be out of proportion to the available tonnage, will in the end prove to be a much more costly plant both in respect of capital invested and in cost per ton of ore treated than one which simply aims at a commercial efficiency to begin with. In other words, the mill which at lowest first cost will give good results is more to be aimed at than the attainment of the utmost theoretical efficiency. As the plant increases in size with growth of tonnage the efficiency of extraction can be increased.

It is not advisable to make large capital expenditures to effect small savings per ton on a small installation. Such capital expenditures are, of course, requisite on large operations such as the "Homestake" mine where on a large tonnage treated a few cents per ton may make large profits in a year's operation. Large plants are the results of industrial evolution over a long period of years and on an assured tonnage. What is possible in practice on a large plant is, therefore, not often commercially advisable on a small plant.

The concentration of argentiferous ores is one of the oldest of all concentration problems. It was tackled a long time ago at two camps where conditions were similar to those existing at Cobalt. These mines were: The Peck mine, Bradshaw Mountains, Arizona, and Silver Islet, Lake Superior, Ontario.

The Peck mine ores were native silver, wire sheet and nugget, associated with chloride of silver, galena and zinc blende. The Silver Islet ores presented a general similarity to those of Cobalt.

The problem in each of these three cases stated is, generally speaking, similar; being the separation of the



silver along with associated sulphide and arsenide minerals from a siliceous or calcareous gangue.

Cobalt ores are native silver, flake sheet and massive, associated with nickel and cobalt arsenides as well as some of the complex sulph arsenides of silver.

The methods which gave results in treatment of the Peck mine ores and of the Silver Islet ores should, therefore, so far as concentration is concerned, be ap-

plicable to the concentration of the Cobalt ores. The variation in practice would arise from the modernization of machinery during the past twenty or thirty years, and the application of such processes as the cyanide or hypo-sulphide to the mill tails. These processes for treatment of mill tails were not invented at the period the two camps mentioned were in operation.

The practice in the cases cited was for low grade ores.

The results obtained from this practice were exceedingly satisfactory.

In designing a concentration plant for the treatment of the ore of a camp, or preferably of a mine (as the ore found in individual mines in any camp may present points of divergence in type that would call for individual treatment and design), the points to be borne in mind are:—

(1) The plant must suit the ore, not the ore the plant.

(2) The plant should be for the treatment of the largest quantity of the lowest grade ore that can be commercially handled; that is, the mine must first be opened up on an extensive scale and the ore occurrence studied.

The general classification of the Cobalt ores up to the present may be given as:—

(1) No. 1—Shipping grade ore.

(2) No. 2—Screenings from picking tables, sometimes of shipping grade.

(3) Ore in greatest bulk too low grade to ship direct from the mine. This must either go to the mill for concentration or go to storage on the dumps.

The valuable constituents in the Cobalt ores are for high grade ore, smaltite, niccolite and native silver; in the low grade or concentrating ores, silver (leaf and flake) and in some cases the sulph-arsenides or sulphides of silver, associated with a small percentage of smaltite, but scattered through a mass of wall rock which is, roughly speaking, silica. The problem is further complicated by the occurrence in the mines of this impregnated wall rock, which is often extremely irregular, so that it is difficult to maintain any uniform average of values in ore to the mill.

The aim of concentration in the Cobalt district should therefore be:—

(1) Save as much of the valuable contents of the ore as is commercially advisable at as low a cost as possible. I use the expression, commercially, as there may be a tendency to make concentration too complicated, and costly. The more simple the process is made, consistent with a commercial saving, the more efficient and economical of operation the plant should prove.

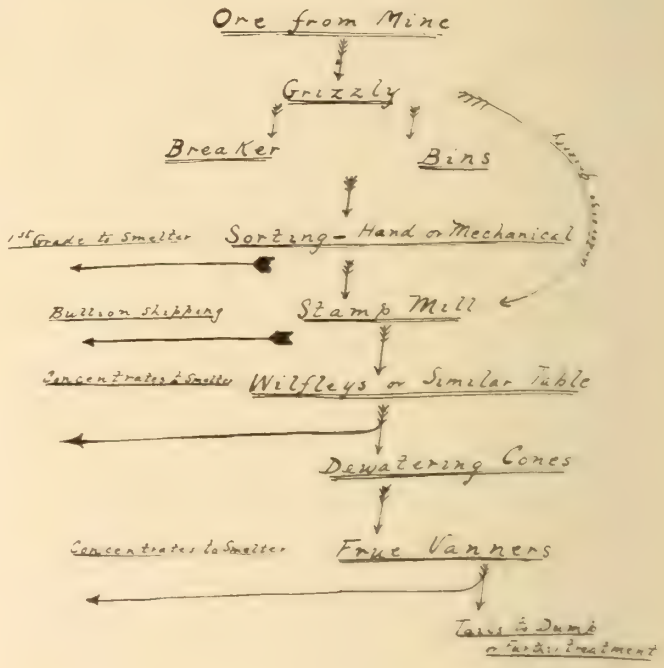
(2) Separate as much of the silica matrix as possible from the valuable ore to reduce freight and smelter charges.

(3) Even in the case of low grade ores it will be found that some of the native silver occurs in a massive form. The process to be installed should aim at the removal of this massive silver as early as possible in the progress of the ore through the mill and to collect as much as possible of this silver in the form of metallics; to be run into ingots for shipment as base bullion.

I would suggest as the result of experiment on the ores of this camp the following method of milling, and concentration, as one that would give good results both as to efficiency and economy of operation and installation.

Flow Sheet.

Method of Concentrating Cobalt Ores



The milling plant should, of course, be placed in the most suitable position to take the ore from the mine at the lowest possible cost.

The ore after delivery to the mill would go over a grizzly set to mesh of final breaker size; i.e., size to be fed to mill, say 1 inch ring oversize on grizzly; next through a rock breaker of standard type, preferably gyratory, set to 2 1-2 inch ring; thence over a picking belt or mechanical sorting device for removal of high grades; next through second breaker set to 1 inch ring; thence to stamp mill bins; next to Wilfleys, or similar tables; thence to dewatering cones; finishing on frue vanners; tails to dump or to final treatment.

The principal value in the ores of Cobalt calling for concentration is metallic silver. I advocate therefore, the preliminary sorting out of high grades before pulverizing for concentration; as experience in milling has taught me that it is exceedingly inadvisable to mix a small quantity of high grade with a large quantity of low grade highly siliceous ore, and then to attempt concentration of resultant mixture, which would be a tonnage presenting great variations in character and value. It will often be found that tails from a mill running on ore of variable grade will appear to give low results; i.e., high extraction. But if an attempt is made to examine ore from the viewpoint of actual loss, startling results may be found.

Let me state a case, that of a mill crushing 100 tons of ore per day of variable grade ore:—

> Two tons high grade, 3,000 ounces per ton.
> Ninety-eight tons low grade, 5 ounces per ton.
> Average value per ton of 65 ounces. Average tails from mill, 10 ounces per ton.

Now 98 tons had only 5 ounces per ton to start and 10 ounces per ton were lost. Therefore in a case of this kind no saving was made by treatment of 98 tons and as total loss was 100 tons by 10 ounces, or 1,000 ounces.

The loss in low grades, $98 + 5 = 490$ ounces.

Therefore, 510 ounces must be directly traceable to loss on two tons of high grade or much more than enough to pay for preliminary sorting of high grades and to leave a good profit. It wil be noticed, also, that an average tailings loss of 10 ounces per ton on 100 tons of 65 ounces ore would mean an 85 per cent. extraction, which at first glance would appear to be quite respectable.

It may be that by stripping ore in mining (where possible) and sacking this ore underground will be a solution of the problem, and where high grade ore will not strip to admit of this sacking, breaking the stopes as narrow as possible, allowing the ore to come down mixed with as small a quantity of low grade or wall rock as practicable, sending this small quantity only over the picking tables, and allowing the large tonnage of known low grade to go past the picking table direct to mill without preliminary sorting, high grade ore such as found in this camp will stand a fair cost per ton for sorting. It must be borne in mind that anything saved by hand picking means 100 per cent. extraction, an extraction which no process of concentration will ever give.

The stamp mill has been successfully applied in many instances to the milling of ores containing native metallics.

The stamp mill as used in crushing ores for concentration may to many appear to be old-fashioned. It is really one of these old methods of crushing which has a wider and more general application than the more recent methods of rolls or roller mills.

The roll is a more specialized machine, good for certain purposes, but in my opinion not particularly suited for crushing the ores found in this camp and its application tends to complicate the practice and to increase the cost of installation.

The common objection to stamps, that of unequal crushing and sliming, can be largely overcome in crushing for concentration, by low discharge, double discharge, coarse mesh, or in other words quick discharge. Get pulp out of mortar boxes as soon as it has reached the desired mesh. The sliming tendency found in gold milling, where battery amalgamation is practised, is largely caused by the necessity of crushing at that rate at which gold will amalgamate in the mortar. Hence by high discharge and fine mesh, the pulp is held in the mortar longer than is really requisite for the simple operation of crushing.

The stamp mill presents an advantage over other methods of crushing as applied to these ores, in that, by what may be termed the jig action of stamp heads in the mortar boxes, the heavy particles of massive silver will tend to fall to the bottom of the mortar boxes, and have a secure lodgment among the dies, where such silver can readily be recovered and, by the scouring action of the stamps due to revolving motion of stamps, in such condition that it can be run into ingots after recovery for shipment as base bullion.

Jigging has, of course, wide application in the concentration of certain classes of ore. However, when the ore has undergone previous hand sorting to remove the high grades there can be no great need of the application of jigs to the ores left for concentration.

Jigging in my opinion is open to several objections in concentration of ore of this type where the principal values are found as metallics in a siliceous gangue.

(1) The occurrence of the silver in the wall rock, which constitutes the great bulk of the ore requiring concentration, is such that if we compare two particles of ore (say from 3-8 inch jig heads of equal mass), respectively, one particle of barren wall rock containing no values and the other piece of wall rock containing leaf or plate silver, then, since the silver is present in such minute quantity, the metallic contents of this class of ore cannot well be expressed in terms of percents. It must be expressed as merely ounces per ton. Further, the presence of this small amount of silver causes no marked difference in the specific gravities of the two particles. The jig being set to save particles of a much greater range of difference of specific gravities than would exist for the case stated, there is a decided tendency to throw out the valuable particle with the barren particle, both going to waste.

This is not a suppositious case, but will be found to be generally true of jigging as applied to this class of ore, and will be true for all meshes of jig product.

(2) As has been previously stated, one of the objects of concentration should be the cutting down of the silica contents of the shipping product. It is a difficult matter to do this, and to make an efficient saving by jigging. If saving is high, silica will be high, if silica is low, loss is high. Loss in jigging can of course be offset by regrinding tails from jigs in a stamp mill, chilian, ball, or other mill and reconcentrating over tables. But why complicate the process in this way? The same results can be obtained in the first stage of milling.

(3) In jigging, little or no silver can be saved in a state that admits of running into bars for shipment as base bullion.

With due attention to speed, drop, mesh discharge and other factors governing the crushing efficiency of the stamp mill, the resultant pulp will be in such a shape as to call for little or no classification.

The whole pulp after discharge from the mortars would go direct to the Wilfleys. Ample table capacity should be provided. In fact the provision of ample table capacity to prevent overloading is one of the most important factors in mill design.

The Wilfleys would make a high grade, low silica, concentrate to smelter; sands to follow on after dewatering to frues.

Any standard type of dewatering device would be suitable. It is necessary to remove excess water before feeding pulp to frues. Ample vanner capacity must be provided. Frues would give low grade, high silica concentrates to smelter. The feed of pulp, and water, and set of all tables is of course a most important matter. No table will give good results unless it is properly handled. The resultant tailings from frues could be sent over canvas or blankets. It is, however, more probable that, should tails carry commercial values, a finishing process, such as cyanide, will be found most applicable. It is not advisable to attempt to instal a finishing process until the grade and value of tails has been ascertained from actual practice.

Sampling for Mill Check.—Accurate and close mill check samples on mill tails in dealing with the ores of this camp is peculiarly necessary. This will be more marked in cases where ore has not been subjected to a preliminary hand or other sorting. It is an exceedingly difficult matter to get any accurate sample of heads to mill. The check must largely come from sampling resultant product and tailings. Accurate sampling devices are therefore requisite.

Should the sampling of tailings be done intermittently it would be difficult to get any accurate indication as to mill results.

The variation in the grade of the ore being very great, at one period low grade may be passing, then suddenly a change to high grade, and so on. A mill may give low average tails, but high tails on high grade ore with the same mill practice. In other words, losses expressed as percentages mean nothing unless the value of heads to mill is given.

> Eighty-five per cent. concentration on 20 oz. ore is good practice.
>
> Eighty-five per cent. concentration on 200 oz. ore is not good.

In the treatment of ores carrying native metallic values, one of the points which I wish to emphasize is: As the high grade silver ores of Cobalt contain values in cobalt, nickel and arsenic, these high grade ores can be handled by preliminary hand or other sorting.

Is it good practice to concentrate a bonanza ore? If mining methods make it necessary for high grades to go to concentrator, why not, where possible, change these mining methods? In gold milling practice ore of $100 per ton or upward is in most cases milled in a unit separate from those in which ore of $10 per ton is treated. It is recognized that greater care is required in the handling of high grade than in handling low grade ores. But this care cannot well be given when the high grade is mixed with a great mass of exceedingly low grade material. The impregnated wall rocks, the real concentrating ore of Cobalt, is really a milling rock complicated by the presence of a small percentage of arsenides. One does not jig a gold quartz. Why jig a siliceous ore, carrying exceedingly small percentages of ore separable by concentration?

The stamp mill with a follow-on process of concentration presents the following advantages:—

(1) Certainty of crushing efficiency.

(2) Saving of heavy metallics in mortars.

(3) Simplification of screening devices and classification; the doing away with elevators (always a source of trouble in a mill); handling all the ore through the mill by gravity, a great advantage in the handling of low grade ores; reduction in the number of stages of pulverization.

(4) The cutting out of values at early stages in the passage of ore through the mill.

(5) Cheapness of installation.

(6) Economical operation.

(7) Efficiency of concentration.

EQUIPMENT OF COBALT MINES—A DETAILED STATEMENT OF MACHINERY INSTALLED.

TOTAL HORSE-POWER AND COMPRESSORS

In the Mines of the Cobalt Camp.

Mine.	Boiler Horse-power Totals.	No. Compressors.	Cub.ft. free air per min.
1. Amalgamated	60	1	282
2. Argentite Mg. Co.	15	..	...
3. Airgoid	25	..	...
4. Alexandra	50	1	197
5. Bonanza Cobalt	25	..	...
6. Beaver Silver Cobalt	80	1	410
7. Big Chief	30	..	...
8. Buffalo Mines	220	1	1015
9. Casey Cobalt Silver Mfg.	80	1	285
10. Casey Mt. Development	25	..	...
11. Century Silver Mg. Co.	20	..	...
12. Cleveland Cobalt	315 (300 gas)	3	1332
13. Colonial	360	1	1297
14. Columbus Cobalt	85	1	300
15. Coniagas	240	1	1015
16. Cobalt Central	240	2	2065
17. Cobalt Consolidated	20	..	...
18. Cobalt Lake	230	1	1325
19. Cobalt Silver Queen	120	1	381
20. Cobalt Townsite	100	1	558

DRILLS

In the Mines of the Cobalt Camp.

Mine.	Make.	PERCUSSION. Ingersoll.	Mac.	McKernon.	AIR HAMMER Rand.	Sullivan.
1. Amalgamated	Rand.	..	1	..	3	..
2. Argentite Mg. Co.		..	..	..	1	..
3. Airgoid		..	..	..	1	..
4. Alexandra	Rand.	..	..	..	2	..
5. Bonanza Cobalt		..	..	..	1	..
6. Beaver Silver Cobalt	Rand.	..	..	..	4	..
7. Big Chief		..	..	..	2	..
8. Buffalo Mines	Rand.	..	..	..	12	..
9. Casey Cobalt Silver Mfg.	Ingersoll-Serg.	..	..	..	4	..
10. Casey Mt. Development		..	..	..	1	..
11. Century Silver Mg. Co.		..	..	..	1	..
12. Cleveland Cobalt	Ingersoll Serg.	..	..	..	6	2
13. Colonial	Rand.	..	..	..	8	..
14. Columbus Cobalt	Gardner.	..	..	..	3	..
15. Coniagas	Rand.	..	..	..	10	..
16. Cobalt Central	Rand.	..	6	..	2	.. 5
17. Cobalt Consolidated		..	..	..	..	..
18. Cobalt Lake	Rand.	..	8	..	1	..
19. Cobalt Silver Queen	Ingersoll-Serg.	5	..	..	..	2
20. Cobalt Townsite	Rand.	..	..	..	6	..

TOTAL HORSE-POWER AND COMPRESSORS

In the Mines of the Cobalt Camp.

Mine.	Boiler Horse-power Totals.	No. Compressors.	Cub. ft. free air per min.
21. City of Cobalt	60	1	282
22. Coleman Developing	20	..	...
23. Canadian Consolidated	20	..	...
24. Derby-Edison	60	1	280
25. Drummond	100	1	285
26. Erie Mines	25	..	...
27. England's Premier	75	1	282
28. Foster Cobalt Mg. Co.	120	1	807
29. Gates	50	..	...
30. Green-Meehan	200	1	410
31. Hongsinger	20	..	...
32. Hunter Cobalt	20	..	...
33. Kelsey-Herbert	20	..	...
34. Kerr Lake	200	2	1619
35. King Edward	270	1	1015
36. La Rose	230	1	1710
37. Lawson	20	..	...
38. McKinley-Darragh	160	2	1296
39. Montreal Cobalt	25	..	...
40. Mutual	25	..	...
41. Mitchell	50	..	...
42. Nancy Helen	300 (250 gas)	1	410
43. Nipissing	908	2	3420
44. Nova Scotia	250	2	1992
45. North Cobalt Mg. Co.	70	1	300
46. O'Brien	300	2	2550
47. Progress	20	..	...
48. Pequot Mines	15	..	...
49. Peterson Lake	100	..	...
50. Pittsburg Cobalt	50	..	...
51. Provincial Mines	80	1	410
52. Ruby Silver Mg. Co.	25	..	...
53. Red Rock	60	1	197
54. Right of Way	225	1	925
55. Rochester	105	1	410
56. Rothchilds	85	1	282
57. Savage	70	1	410
58. Silver Bar	60	1	282
59. Silver Leaf	80	1	410
60. Sharpe Lake Mines, Ltd.	15	..	...
61. Silver Bird	50	..	...
62. Silver Cross	25	..	...
63. Smith & Flynn	20	..	...
64. Stella Mg. Co.	15	..	...
65. Strathcona Silver Mg. Co.	25	..	...
66. Taberner, W. W.	20	..	...
67. Thompson, A.	20	..	...
68. Temiskaming	120	1	558
69. Temiskaming & H. B.	120	1	1510
70. Trethewey	140	1	1015
71. Temiskaming Cobalt	15	..	...
72. United States	25	..	...
73. United Princess	25	..	...
74. United Fisher Epplet	60	1	282
75. University	125	1	485
76. Victoria	100	1	410
77. Wonderland	30	..	..
78. Wabi	60	1	282

DRILLS

In the Mines of the Cobalt Camp.

Mine.	Make.	PERCUSSION. Ingersoll.	Mac.	McKernon.	Rand.	AIR HAMMER. Sullivan.	
21. City of Cobalt	Rand.	..	..	..	3	..	..
22. Coleman Developing		1	..	..	..	..	..
23. Canadian Consolidated		..	..	..	1	..	..
24. Derby-Edison	McKernon.	1	..	2	..	..	..
25. Drummond	Ingersoll-Serg.	4	..	..	..	..	..
26. Erie Mines		..	..	..	..	..	..
27. England's Premier	Rand.	..	1	..	3	..	..
28. Foster Cobalt Mg. Co.	Ingersoll-Serg.	..	..	..	7	..	..
29. Gates		..	..	..	..	..	..
30. Green-Meehan	Rand.	..	4	..	..	..	..
31. Hongsinger		..	..	..	..	..	..
32. Hunter Cobalt		..	1	..	..	..	..
33. Kelsey-Herbert		..	..	..	2	..	..
34. Kerr Lake	Rand.	..	5	..	15	..	..
35. King Edward	Rand.	..	8	..	5	..	..
36. La Rose	Rand.	..	..	..	20	..	..
37. Lawson		..	..	..	..	..	..
38. McKinley-Darragh	Ingersoll-Serg.	..	..	..	9	..	..
39. Montreal Cobalt		..	..	..	1	..	..
40. Mutual		..	..	..	1	..	..
41. Mitchell		..	..	..	..	..	..
42. Nancy Helen	Rand.	..	1	..	3	..	..
43. Nipissing	Rand.	..	20	..	..	..	10
44. Nova Scotia	Rand.	12	..	..	..	1	..
45. North Cobalt Mg. Co.	McKernon.	..	..	3	1	..	..
46. O'Brien	Ingelsoll-Serg.	6	8	2	2	..	..
47. Progress		..	..	..	1	..	..
48. Pequot Mines		..	..	..	1	..	..
49. Peterson Lake		..	..	..	..	1	..
50. Pittsburg Cobalt		..	..	..	..	..	..
51. Provincial Mines	Rand.	..	3	..	..	..	..
52. Ruby Silver Mg. Co.		..	1	..	..	..	..
53. Red Rock	Rand.	..	..	..	3	..	..
54. Right of Way	Ingersoll-Serg.	4	..	..	1	..	2
55. Rochester	Rand.	..	..	..	4	..	..
56. Rothchilds	Rand.	..	..	..		..	..
57. Savage	Rand.	..	..	..	4	..	..
58. Silver Bar	Rand.	..	1	..	3	..	..
59. Silver Leaf	Rand.	3	..	..	1	..	..
60. Sharpe Lake Mines, Ltd.		..	..	..	1	..	..
61. Silver Bird		..	..	..	2	..	..
62. Silver Cross		..	..	..	1	..	..
63. Smith & Flynn		..	..	..	1	..	..
64. Stella Mg. Co.		..	1	..	1	..	..
65. Strathcona Silver Mg. Co.		..	..	..	1	..	..
66. Taberner, W. W.		..	..	..	1	..	..
67. Thompson, A.		..	..	..	1	..	..
68. Temiskaming	Sullivan.	..	1	..	5	..	..
69. Temiskaming & H. B.	Rand.	..	6	..	1	..	..
70. Trethewey	Rand.	2	2	..	2	..	..
71. Temiskaming Cobalt		..	..	..	..	..	..
72. United States		..	..	..	1	..	..
73. United Princess		1	..	..	..	..	..
74. United Fisher Epplet	Rand.	3	..	..	..	..	..
75. University	Ingersoll-Serg.	3	..	..	..	..	..
76. Victoria	Rand.	..	..	..	..	..	..
77. Wonderland		..	..	..	1	..	..
78. Wabi	Rand.	..	..	..	3	..	..

Note.—Air hammer drills as above are of followings makes: Murphy, 13; Waugh, 3; Hardseeg, 2; Sullivan, 2; Shaw, 1. Total, 21.

POSSIBILITIES IN THE ELECTRIC SMELTING OF IRON ORES.*

By Alfred Stansfield, D.Sc., Montreal.

(Ottawa Meeting, March, 1908.)

In view of the many recent attempts that have been made to employ electrical energy instead of fuel for the smelting of iron ores, it appears worth while to indicate, in a short paper, what can probably be accomplished in this direction, the manner in which the successful results can be obtained, and the advantages and drawbacks of the electrical process.

In ordinary metallurgy of iron the ore is smelted in a blast furnace with coke, producing pig iron. This is an alloy of iron with some 2 per cent. to 4 1-2 per cent. of carbon, 1-2 per cent to 4 per cent. of silicon and small quantities of other elements. It is decidedly more fusible than wrought iron or steel, and on this account is very suitable for foundry purposes. Bessemer steel and open hearth steel are made from pig iron by removing from it in the Bessemer converter, of the open hearth furnace, a considerable proportion of the carbon silicon, etc., which it contains, the product being nearly pure iron retaining a little carbon and some manganese.

Crucible steel is used for tools. It contains about 1 per cent. of carbon, and is made by adding the necessary amount of this element to pure varieties of iron or steel, and melting the material in crucibles so as to obtain a perfectly sound product.

Electrical energy has recently been employed to replace, in such operations, the heat which is ordinarily obtained by burning fuel. Electrical energy is somewhat expensive, and it was naturally employed at first for the production of the more valuable products, such as crucible steel, where the cost is of less importance. The electrical production of cast steel for tools and similar purposes may be accomplished in two ways—(1) by melting down pure varieties of iron and steel with suitable additions of carbon and other ingredients, just as in the crucible process, but using electrical energy for heating instead of coke or gas; (2) by melting a mixture of pig iron and scrap steel as in the open hearth process, and removing the impurities, such as sulphur and phosphorus so thoroughly by repeated washing with basic slags that a pure molten iron is at last obtained. This can then be recarburised and poured into moulds. Both of these methods are now employed commercially for the production of good qualities of tool steel. The larger sizes of electrical furnace that have already been constructed hold 5 or 10 tons, while the crucible will only hold about 80 pounds, and the high efficiency of the electrical method of heating more than compensates for the greater initial cost of electrical energy as compared with heat derived from fuel. The resulting steel is found to be even better than crucible steel, and can be produced at less cost. It is therefore, only a question of time until the crucible process shall be entirely replaced by the electrical process in all localities where electrical energy can be produced at a moderate figure.

Two forms of electrical furnace have been used for making cast steel:—(1) the Héroult steel furnace, which resembles an open hearth furnace, through the roof of which hang two large carbon electrodes. Electrical connections is made to these carbon electrodes and electric arcs are maintained between the lower end of each electrode and the molten slag in the furnace, thus producing the necessary heat. This form of furnace has been found to be very suitable for the second of the above processes, that is, the one in which pig iron and scrap steel are melted together and refined until pure enough to convert into cast steel.

An entirely different form of furnace has been devised in which no electrodes are required. This furnace consists of an annular shaped trough containing the steel. This ring of steel acts as the secondary of an electrical transformer. An alternating current is supplied to a primary winding, and the primary winding and the ring of steel both encircle an iron core, as in the ordinary transformer. The alternating current in the primary circuit induces a very large alternating current in the secondary circuit, that is, in the ring of steel, and in this way enough heat is produced to melt the steel. This type of furnace has been constructed lately in somewhat large sizes holding as much as 8 tons of steel and consuming 1,000 electrical h.p. It is apparently wel lsuited for the first mentioned process, that of metling down pure varities of iron and steel, just as in the crucible process.

The amount of energy needed in these furnaces amounts to about 800 or 900 K.W. hours per ton of steel, using cold stock, or 600 or 700 K.W. hours when the pig iron, which usually forms part of the charge, is supplied molten. This amount of electrical energy would cost more than the coal used in producing the same amount of steel in the open hearth furnace, but the resulting steel is far more valuable than the open hearth steel.

The above short account of the production of crucible steel in the electric furnace has been introduced, as this is the only commercial process for the production of iron or steel, which is at present in operation. The present paper deals rather, however, with the electrical smelting of iron ores.

In reducing iron ore to a metal, iron can be abtained in a relatively pure state, such as wrought iron, and this was the method adopted by the acient metallurgists in their small furnaces or hearths; but in the modern blast furnace, with its higher temperature, the coke which is needed for the production of heat carburises the resulting iron, producing nig iron. In the electric furnace, however, fuel is not used for the production of heat, since this is obtained electrically. Some carbonaceous material must be added to the charge in order to eliminate the oxygen of the ore yielding metallic iron, but the amount of this carbonaceous material can be regulated so as to yield either pure iron, steel or pig iron at will.

Although this has been realized by the pioneers in the electric smelting of iron ores, certain difficulties in the operation have led them to smelt the ore for the production of pig iron instead of for the production of steel, although the difference in price of these materials would be sufficient to pay for all the electrical energy needed for the direct production of steel from iron ore.

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and it is surprising that this more attractive proposition has not gained more attention from metallurgists.

A number of experiments have been made on the direct reduction of steel from iron ore in the electric furnace, but the most satisfactory work that has been accomplished relates to the production of pig iron from the ore, and this will be described first. This work has been carried out by Héroult, Keller and others. The furnaces they have adopted are similar to the one employed by Héroult recently in the experiments at Sault Ste. Marie. This consisted of a vertical shaft similar to a small blast furnace, in which hung a central carbon and served as the other electrode, the electric current passing between the hanging electrode and the molten metal in the crucible of the furnace. The ore, with fluxes and carbon sufficient for its chemical requirements, was fed in around the vertical electrode, and became heated and melted by the heat produced by the passage of the current. The electric current in this furnace produces enough heat to carry out the chemical reactions involved in the reduction of the ore to metal, and the fusion of the resulting pig iron and slag. The carbon is required for the reduction of iron oxide to metal and for the carburisation of the metal to form pig iron.

The Keller furnace is practically the same as the Héroult furnace, except that it consists of two shafts instead of one and that these two shafts are worked in conjunction with one another, the current entering through the vertical electrode in one shaft and leaving by the vertical electrode in the other shaft. A connecting trough or passage enables the electric current to flow form one part of the furnace to the other, and serves to collect the resulting pig iron and slag from both of the shafts. This has the advantage of using a higher voltage than the single shaft furance of Héroult. The results of operating furnaces of this class show a consumption of electrical energy of about 0.3 h.p. year, and about 800 or 900 pounds of coke or good charcoal per long ton of pig iron. Supposing that the general costs of operating this furnace and the blast furnace were equal, these figures would indicate that the electrical furnace would need to obtain energy at a cost per h.p. year of less than that of two tons of coke in order to compete with the blast furnace. Thus, if coke costs $3.00 a ton and electrical energy $5.00 per h.p. year, the cost would be about the same by the two processes, and with power at $12.00 per h.p. year, the electric furnace could not compete with the blast furnace unless the price of coke were as high as $7.00 per ton. In considering these figures it should be remembered that the heating power of one electrical h.p. year, is about the same as that of three-quarters of a ton of good coal or coke, assuming that the latter is completely burned. Looked at from this point of view, it will be obvious that even these small and admittedly imperfect electric furnaces are more economical, that is to say, they use the heat better than the large blst furnaces.

The electrical furnace possesses certain advantages over the blast furnace, which in some cases may over ride the high cost of electrical power. One is its ability to use without much trouble ores of a sandy or powdery character. This ability depends upon the absence of a blast in the electrical furnace. In the blast furnace powdery ores are liable to be blown out of the furnace by the blast, or it obstructs the passage of the blast through the furnace. In the electric furnace there is no blast introduced and these difficulties are less serious. Another advantage of the electric furnace is in regard to the smelting of titaniferous and other difficultly fusible ores. On the blast furnace these ores are liable to give trouble on account of the slag becoming pasty, but in the electric furnace it is possible to obtain a higher temperature and thus to overcome any difficulty of this kind. The high temperature which can be obtained in the electric furnace is advantageous in regard to the treatment of sulphurous ores. In the iron blast furnace, the sulphur contained in the coke or the ore is prevented from entering the pig iron by the present of lime and by maintaining strongly reducing conditions in the furnace; the lime then forms calciumsulphide, which passes into the slag. In the electric furnace it is possible to obtain higher temperatures, thus enabling a larger proprtion of lime to be used, and even more strongly reducing conditions to be obtained than in the blast furnace. Large amounts of sulphur can, therefore, be eliminated in the electric furnace, as has been shown in the experiments at Sault Ste. Marie.

Another point in favor of the lectric furnace is that it does not require, as the blast furnace does, a very high quality of coke for fuel. In the blast furnace a soft or powdery coke becomes crushed and obstructs the action of the furnace, and is less efficient than a harder variety; but in the electric furnace, where the coke or charcoal is needed merely as a chemical re-agent, any convenient form of carbon can be employed—coke, charcoal or small, anthracite—and probably in improved furnaces even such fuel as peat, sawdust or soft coal could be utilized for reduction for reduction.

Looked at from a commercial point of view the electric furnace producing pig iron has many difficulties to overcome before it can compete successfully with the blast furnace. One very important difficulty is the small scale on which the electric furnace has so far been constructed. It will be seen from the account of the Héroult furnace that the height of the shaft of this furnace is limited by the length of the electrode, which is introduced into it. More recent furnaces have been designed by Dr. Haanel and by Mr. Turnbull, in which this difficulty has been overcome by a system of inclined or lateral shafts down which the ore passes, so that the electrode does not hang down the whole height of the ore column. Another weak point in the construction of the electric furnace is that no provision has been made for utilising the carbonaceous gases which escape at the top of the furnace. In the Turnbull furnace already referred to, it is proposed to utilise the gas by burning it in a rotating tube furnace down which the ore passes before it enters the electric furnace and is mixed with the charcoal. In this way the heat available in this gas will be utilized, and an economy in the working of the furnace may be expected.

In view of the importance of reducing the consumption of fuel and electrical energy to the lowest possible point, the writer has calculated what could be expected in this way if the gases arising from the reaction between the charcoal and the ore were used partly for the reduction of the ore and partly for preheating the ore. Such a result could be attained in a furnace consisting essentially of three parts. In the upper part the otherwise waste gases are burned by air introduced there and communicate their heat to the incoming ore to which the fluxes, but not the charcoal have been added. In the middle portion of the furnace the gases arising from the lowest portion, which may be considered to be wholly carbon monoxide, react on the heated ferric oxide, if that were the variety of ore to be treated, and reduces it to ferrous oxide. The charcoal is introduced in the lowest section of the furnace and completes the

reduction of the ore to metal. Electrical energy is introduced into this section of the furnace and serves to melt the resulting pig iron and slag, and to supply the heat necessary for the preceding chemical reactions. The details of the construction of such a furnace have not been worked out at present. In a furnace of this kind it can be calculated that one ton of pig iron can be obtained from an everage ore by the use of 0.2 h.p. years of electrical energy and about 600 to 800 pounds of coke or good charcoal. This includes a reasonable allowance for loss of heat. A further allowance should be made for irregularity in the use of the electrical power and, taking this into account, we may consider that one-quarter of a h.p. year and 600 to 800 pounds of coke or charcoal wuold be required for one long ton of pig iron from the ore.

Considering these figures, it will be seen that the use of 1-4 electrical h.p. year will save about 2-3 of a ton of coke, or that 1 electrical h.p. year should not cost more than 2 2-3 tons of coke, if the electrical furnace is to compete with the blast furnace. Thus, an electrical h.p. year, at $12.00 would correspond to coke at $4.50 a ton. The considerations previously mentioned in regard to the use of cheaper fuel and cheaper ore in the electric furnace would also apply in this case, and with improved design and construction thesize of the electric furnace may be increased so as to admit of a large and economical output of pig iron.

Electric smelting plants on a small commercial scale have been put up at Welland, Ontario and Baird, California. While very little has been heard of these, the writer understands that at Baird, considerable difficulties have ben met with in the operation of the furnace. No doubt these difficulties will ultimately be overcome. No attempt has been made at present to utilize the waste gases, but this point will be attended to later.

The direct reduction of steel from the ore has been carried out by Stassano and others, but no economical scheme for this purpose has ever been put into operation on a large scale. The Stassano furnace consists of a chamber, about one metre cube, lined with magnesite bricks. The ore, mixed with the necessary fluxes and charcoal for its reduction and made up into briquettes, is placed in this chamber, and is heated by an electric arc, which is maintained above the ore. In this furnace it is possible to reduce the ore to metal and to remove any impurities, such as sulphur and phosphorus, although Stassano did not actually demonstrate this as the ores he employed were very pure. The method of heating the ore is, however, uneconomical, and it was not to be expected that commercial results could be obtained. Stassano still experiments with his furnace, but no longer uses it for direct reduction of the ore.

Steel has also been obtained directly from the ore by Dr. Héroult in his electric steel furnace mentioned in the early part of this paper, but he found the process uneconomical and preferred to use pig and scrap as the materials for making steel in his furnace. Experiments in the laboratory have been made at different times with a view to the difect reduction of iron ore to steel. In this connection may be mentioned the experiments of Messrs. Brown and Lathe in the Metallurgical Laborratory, at McGill, which were described in the last number of the "Institute Journal." These experiments are being continued this year and the writer hopes to be able to communicate some interesting results at a later date.

In operation for the direct reduction of iron ore to steel the following difficulties should be borne in mind:—

1. The difficulty of eliminating sulphur, when this is present in the ore, the blast furnace producing pig iron being far more efficient in this particular than a steel furnace, such as the open hearth. It may possibly be necessary on this account, only to use ore that are relatively free from sulphur in the direct production of steel.

2. Another difficulty lies in the different conditions required for the reduction of the ore and the final refining treatment to which the resulting steel must be subjected. Thus the operation of making steel must always be intermittent in character, while the reduction of ore in the blast furnace is a continuous operation.

Until these and other difficulties have ben overcome, it is not likely that we shall have any successful producion of steel directly from iron ore on a commercial scale. Nevertheless, the high price of steel as compared with pig iron renders this proposition particularly attractive to the electro-metallurgist. At present the most satisfactory method appears to be that of reducing the ore to pig iron in one furnace, and turning this into steel in a separate furnace as in ordinary metallurgical practice.

MEERSCHAUM IN NEW MEXICO.

For more than a century meerschaum has been extensively used in the manufacture of pipes and cigar holders, the principal source of supply for the material being deposits in the plains of Asia Minor, about 120 miles southeast of Constantinople. These deposits are said to have been worked for other uses for more than a thousand years.

The German name meerschaum "sea foam" is paralleled in French by "écume de mer," which may be less beautifully translated "scum of the sea." The mineralogist will tell you it is sepiolite, a hydrous silicate of magnesia, but this designation will not diminish the smoker's enjoyment of his meerschaum pipe.

The ease with which meerschaum can be carved, its whiteness, and the fine polish it takes with wax render its especially suitable for elaborate carving and artistic treatment in the manufacture of pipes. These pipes are prized for the rich cream-brown or brown color that the bowls assume after being smoked a while. This color is caused by the permeation through the meerschaum of the mixture of the nicotine from the tobacco with the wax used in polishing the pipe. As long as there is absorbed wax in the meerschaum the color of the pipe will grow darker and with continued smoking will become nearly black. It is therefore necessary to "fix" the color of the pipe when the proper shade is reached. The method employed to accomplish this is in part a trade secret.

The manufacture of meerschaum into pipes is a thriving industry in parts of Germany and Russia, employing more than 3,000 workmen. It is said that the supply of meerschaum for this industry is becoming low, and the discovery of deposits of the mineral in New Mexico is therefore interesting.

Two deposits of meerschaum have been located in the upper Gila river valley, one about 23 miles east of north of Silver City, the other at a mine about 12 miles northwest of Silver City.

Mr. Douglas B. Sterrett, of the United States Geological Survey visited the mine in October, 1907, and

has prepared a report on the deposit there which has just been published by the Survey as a part of an advance chapter of Bulletin No. 340, "Contributions to Economic Geology, 1907." The deposit lies in the bottom and walls of the canyon of Bear Creek, occurring in veins, lenses, seams, and balls in limestone in both nodular and massive form. The nodular meerschaum thus far tested contains iron stains and particles of grit and is inferior to the meerschaum of Asia Minor. The more compact, massive material may perhaps be found free from stains and of better quality.

Mr. Sterrett's report sketches briefly the geological relations of the deposits, describes the mode of occurrence of the meerschaum, and presents the results of chemical and physical tests and analyses of the mineral.

The pamphlet containing the report may be had on application to the Director of the Survey, at Washington, D.C.

DESCRIPTION OF THE MONTANA-TONOPAH COMPANY'S MILL.

(Written for The Canadian Mining Journal.)

The ore from the mine is dumped into a steel ore bin at the head of the shaft and is drawn therefrom through an ore bin of the counterbalanced type into a No. 5 Gates styles "K" breaker. This crusher is set to crush all to pass a 2 inch ring. The product is delivered to a No. 5 "B" Gates continuous bucket elevator, which elevates and discharges same into a Gates 40 inch by 12 foot iron frame revolving screen without internal spiders and having 1 inch perforations. The product passing through the holes is delivered directly to the conveyor for transportation to the mill. The oversize which does not pass the hole is delivered by gravity to the two No. 3 style "D" Gates crushers. These crushers are of the special short head type for fine crushing and are set to make a product which will pass a 3-4 inch ring. The product of these crushers is also delivered to the conveyor above mentioned.

The ore now being all reduced to about 3-4 inch size, is conveyed by a travelling belt conveyor having a belt 14 inches wide to the mill building. This conveyor is about 194 feet long and travels up an incline of about 40 feet in this distance. At the entrance to the mill building this conveyor discharges the ore on to another conveyor of the same size and type, but operating in a horizontal plane at an angle of 30 degrees from the line of the other and it is about 91 feet long. This conveyor is provided with an automatic tripper or distributor, which travels along the length of the ore bins in back of the batteries, delivering the ore automatically into the bins the entire length.

At the point where the ore is discharged from the first conveyor on to the second there is installed a Cole automatic sampling device to take a sample of the crushed ore. This is very ingenious and about the best devised sampler that is made for ore discharged from a belt conveyor. Mr. D. Cole, assistant manager of the Cananea Cons. C. Co., made the first design and installation of this sampler at their mills, and it has proved a great success. The arrangement is such that a cutter or sample scoop is made to pass through the ore stream and take a sample across the full width of the belt during its passage. The frequency of the sampler can be arranged for in the driving mechanism.

The crushed ore is drawn from the bins back of the batteries through ore bin gates into the automatic feeders, which are of the suspended or hanging type, which can be moved back from the mortars when necessary thus giving a large working space for making the usual repairs. There are eight bin gates and feeders, one for each battery.

There are forty stamps, weighing about 1,050 pounds each. They are arranged in eight batteries of five stamps each in a mortar and each battery is driven by a belt and tightener from the countershaft. The batteries are made right and left hand, set in three-post frames. The mortars are of the narrow rapid crushing, quick discharge type, and the principal battery parts are steel to insure maximum wearing life. The ore is crushed through 12-mesh screens on the mortars.

The pulp from each five stamp battery is delivered to a 24 inch cone classifier or sizer, which makes two products. The spigot, or coarse product, of each is delivered to a Wilfley concentrating table, of which there are eight in all, and the overflow from each cone is delivered to the two Dorr classifiers. The tailings from the Wilfley tables are also delivered to the Dorr classifiers by belt and bucket elevators, which are made necessary on account of the contour. In the Dorr classifiers a separation of the sand and slimes is made mechanically. It is aimed to crush all the pulp to one hundred mesh and finer in the tube mills, and these classifiers separate that part of the pulp which is already crushed to this size and it is delivered to the thickening cones for concentration on vanners, as later mentioned. The coarse sand product from the Dorr classifiers is delivered into two 5 foot by 22 foot Gates trunnion type wet grinding spur gear driven tube mills. These mills are provided with silex flint brick linings 4 inches thick, and the initial charge of pebbles for each mill is 10 tons. The sands are all ground to 150 mesh or finer in these mills and each mill discharges its product into a classifying cone 4 feet diameter. These cones are for the purpose of separating any sands from the product which might have passed through the mill without being reground fine enough, and the sands are elevated back to the Dorr classifiers to be again fed to the tube mills. The finished product is delivered to spiral sand pumps, by which it is elevated to 2 large settling or pulp thickening cones, where with the excess of water removed it is sent to the cyanide plant. The thickened pulp from the bottom discharge is delivered to 16 standard frue vanning machines or concentrators having endless rubber belts 6 feet wide. These concentrators remove and collect any fine sulphides after regrinding, in addition to that saved by the Wilfley tables. This concentrate pro-

duct is collected and dried, after which it is shipped to the smelters.

The tailings from the vanners and the overflow from the settling cones are delivered to any one of three dewatering tanks in the cyanide plant. These tanks are provided with filters through which the water is drawn off and flows to a final settling box to collect any slimes carried in suspension, after which it is delivered to a water sump tank to be pumped back for re-use in the mill.

The thickened and dewatered pulp from the settling tanks is drawn off from the bottom discharge through a pipe line connected to the suction of a centrifugal pump. This pipe line is arranged so that the contents of any tank can be drawn off and a cyanide solution pipe is connected up with same to introduce solution if desired. The pulp is delivered by the pump into the agitator tanks. There are six agitators of the Hendryx type for treatment of the pulp, this number being required on account of the predominating value being silver and requiring about 24 hours to bring same into solution. After the required period of agitation the pulp is drawn from these tanks by a centrifugal pump and delivered into the pulp storage tank. This tank is provided with a stirring gear which keeps the pulp in gentle agitation to prevent same settling. From this tank the charges are drawn into the filter tanks as required.

The filter system used for removing the solution from the pulp is the Butters Vacuum System, consisting of two filter boxes, each containing 72 filter leaves. A charge of pulp is delivered to the filter box and after removing the solution by a vacuum applied to the filter leaves and following with the necessary washes, the pulp is discharged through the bottom from the filter leaves, and is sluiced out to waste. The solution is collected in a small storage tank and is pumped through a clarifying filter press into anyone of three precipitating tanks.

Precipitation is effected by means of zinc dust introduced in the form of an emulsion and with agitation by compressed air until the cycle is completed. The contents of the precipitating tanks are pumped up to the refining plant and the precipitate is collected by passing the material through filter presses where the precipitate is collected on the filters in cakes and the solution is delivered to the storage tanks for re-standardizing and used again. The cakes collected are dried and shipped to the refineries for reduction to bullion.

The mill is driven throughout by electric motors, and these motors are distributed so as to give unit drives to the various departments. The current used is bought commercially and is 60 cycle, 3 phase, 440 volts, transformed down from 6,600 volts and distributed from the main switchboard to the various motors located at the different points in the separate buildings. The motors are of the Allis-Chalmers standard induction type, and this company furnished all the electric equipment, including transformers, switchboards, etc.

The plant is arranged in separate buildings to conform to the contour of the country and also for protection against fire.

The elevators and pumps for handling slimes, solutions and water are installed in duplicate to insure against stopping of the entire plant when making necessary repairs to these machines.

The capacity of the mill is rated at 200 tons per day, and the crushing plant is capable of handling double this capacity in a single shift if necessary. A remarkable feature of this plant is the short time consumed in building it and placing it in successful operation. As soon as power was available for operating the entire mill after its erection, it was placed in daily operation and handled the rated tonnage practically from the start. The details had been worked out so completely in every point that the entire plant was a success commercially, metallurgically and mechanically from the start.

The plant was designed by the Allis-Chalmers Company under the able direction of Mr. F. L. Bosqui, consulting engineer for the Montana-Tonopah Mining Company, to whom full credit is due for its immediate success.

THE ASSAY OF SILVER ORES.

W. K. McNeill.*

The writer has been asked to follow up his former article by another dealing with the silver assay in detail.

The pyro-chemical method for silver and gold has been found necessary owing to the fact that the metals are found disseminated through the rock or gangue in such relatively small quantities that the ordinary gravimetric method is out of the question, both on account of the large quantity of ore that would have to be operated on, and because of the time consumed in such an operation.

The processes of the silver assay consist in (a) roasting; (b) crucible fusion and scorification; (c) cupellation.

The first is to remove any sulphides which the ores contain, but it must be remembered that in the ores such as those of Cobalt, if they contain smaltite or niccolite, they cannot be subjected to this process. By a series of careful experiments, it has been found that in the volatilization of the arsenic there is a great silver loss. This process, then, can be entirely omitted in the characteristic Cobalt ores.

Crucible Fusion.—Weight of ore, one-quarter to two or more assay-tons, depending on the supposed richness of the ore.

The ore is previously ground to a very fine powder, and the metallics removed and assayed separately, as they cannot be so mixed with the powder as to make a homogeneous sample. To the weighed portion of ore is now added a charge of standard flux, litharge, silica, assayers prefer to use as a reducing agent sulphide of and some reducing agent, such as argols or charcoal. Many iron, but this does not give as good results as the argols; although, if the ore is pyritic, the amount of reducing agent may be decreased, so as to utilize the pyrite and give the desirable size of lead button (15 to 25 grams).

A great many assayers invariably dispense with roasting, and estimate the reducing power of the ore. They then add enough reducing agent to give the required weight of lead and if the ore is very rich in reducing agents enough nitre is added to neutralize the excess

*Manager Canadian Laboratories, Toronto, Ont.

But generally the assayer depends on his own appraisal of the ore, estimating the general composition and making up a flux that will be fusible at redness to a mobile slag. If the ore is silicous, containing quartz or silicates, then add iron soda carbonate to the standard. If the ore is more basic, then add silica, and if decidedly basic then the charge can be mainly litharge and silica.

A few points are worth noticing here:—

(1) The litharge should be tested for silver.

(2) If the charge "boils," owing to an excess of silicates, it should be put into a very hot muffle at first.

(3) Nails should be added to combine with any refractory pyrite.

(4) The charge should be thoroughly mixed.

Scorification.—In this process, used altogether for cobalt and nickel bearing ores and metallics, the charge of one-tenth assay-ton is mixed with ten to fifteen times its own weight of test lead free from silver, and thoroughly mixed, and a small quantity of borax glass added. If, as stated before, a small film of litharge is placed over the charge in the scorifier, it will improve the operation. The assay should be placed in a hot muffle. The causes of "bumping" have been previously mentioned. If slag becomes too viscid it can be remedied by the addition of some glass slag saved from crucible work.

Cupellation.—This operation depends on the facts that lead is easily oxidized by air, and that the precious metals resist oxidization even at a high temperature, although silver will steadily oxidize in the muffle during cupellation if the temperature becomes too high.

The cupel is made of "bone ash," or "cement." Experiments on these two substances show that bone ash is slightly more rapid than cement, and that it will at ordinary cupelling heat absorb the last traces of lead better. But cement, on the other hand, will absorb as well if, during the last stages, the temperature of the furnace is increased. They also have the advantage of being cheap and durable.

The process for the "scales" or metallics is outlined in all text-books.

In all silver assaying a great many duplicates should be run if any exact results are to be obtained. It is also advisable to correct for volatilization. For exact work, also, the combination of wet and dry methods is perhaps better, the ore being dissolved in the usual way and the silver precipitated as a chloride. The residue from solution is carefully assayed for silver as well as the precipitated silver chloride. This item was omitted by a writer in the *Engineering and Mining Journal,* hence accurate comparisons could not be obtained.

A splendid device for even cupelling in a furnace, when the heat is uneven, is the "cooler," an iron plate which can be held over the cupels and withdrawn when the temperature lowers. By this method all the assays can be "feathered."

SALT RESOURCES OF SUSSEX, NEW BRUNSWICK.

Present indications point to a scientific and systematic development of the salt resources of Sussex, King's County, and the vinicity. From Havelock to Salina, or Salt Springs, the entire series of valleys are abundant in salt springs varying in density of brine. A boring of some seventy feet was made several years ago (no log of boring has been kept), and the brine overflow from this boring tests one hundred per cent. more than the surface brine that had been used for nearly a hundred years, during which salt had been made from these springs, and in some instances the product has been found to be particularly pure, having been used largely for dairy purposes. Up to the present only the most primitive methods have been employed in making salt, the brine having been boiled in the ordinary cast iron pots, thus entailing a very large waste of fuel. The principal operations seem to have been carried on at Plumeseep, on what is known as the old Kendrick property, where, in all, seven springs have been located. Most of these have been tested and show an average strength of twenty per cent. The origin of the springs is a mystery, and with a view to solving it an English concern has been organized with a capital of £50,000, and there is every prospect of heavy development being carried on within the coming year.

Dr. R. W. Ellis, of the Geological Survey, visited the springs last summer, and as a result of an examination was very favorably impressed with their possibilities and recommended that boring be begun to test the origin of the flows. This will be carried out in the near future and it is fully expected that large secondary deposits will be discovered.

It may be of interest to note here that the waters flow close to a fresh water stream, and travellers are frequently surprised on finding it saltier than sea water.

It is the intention of the parent concern, which controls the Kendrick property, to send over one of its directors, who will make a fuller examination of the situation, and, in the event of a favorable report from him, it is probable that next summer a large sum of money will be expended in the vicinity. Other parties are interested in the location of salt deposits, and the right to bore will be acquired. Should a salt bed be located, there is a very strong possibility, it is believed, of building up an industry that will hold an important position in the development of the trade of the province.

The concern organized to carry on the manufacture of salt is known as the New Brunswick Canadian Salt Company, Limited, with its head offices in London. The Canadian solicitor is Walter H. Trueman, of St. John, and Harold D. Buchanan is resident manager.

Considerable has already been accomplished in the establishment of the plant. The installation of two large vats, into which the brine flows to be reduced to a proper saturation, and the placing of the boilers for the reduction of the salt to crystalline form, have been done with a view to the use of every particle of heat. The system, which is a new one, provides for the passage of all flame used under the boilers through tubes extending back under the evaporating vats. Thus the heat produced does double duty, and, to a large extent, solves the problem of cheap fuel, the most important factor in salt manufacturing. The intention is to install

about thirty additional vats and boilers, should the company's experience in its later development work prove satisfactory. This will give a capacity of many barrels daily. Favorable reports have been received, but until the diamond drills are sent below, the real test will not be known.

If salt beds are discovered it will be almost a guarantee of immense areas of salt located in the province.

The large salt beds of Michigan, where most of the salt consumed in the neighboring republic is manufactured, extend for hundreds of miles and are practically inexhaustible. The Canadian beds at Goderich are also of great extent, being controlled largely by the Canadian Pacific Railway. On both sides of the border the same methods are employed to bring the salt to the surface. After the holes are sunk they are piped and then water is forced down and pumped up after it has been properly saturated with brine. These solutions are very dense and produce a painful sensation when brought in contact with the tongue.

Everything of course depends on what is known as the secondary deposit of salt. If the brine comes from the bowels of the earth, it is impossible to reduce it with anything like a proper margin. As the waters of the spring rise, they come into contact with the surface drainage and thus are reduced in saturation and can only be brought back to their original strength by the use of fuel. The condition is equally true of the flows from the initial and secondary deposits, but where the latter are encountered the modern methods of pumping overcome this difficulty and gives a brine with sufficient saturation to enable the operator to place it in the vats at once.

One cannot overestimate the importance of a discovery of secondary salt, with the great Maritime Province markets at hand. Transportation would be reduced to a minimum and the price of fuel very low at the point referred to.

After years of experiment, something is proposed which will either shatter the most sanguine hopes, or gives to Sussex and its vicinity industries that will mean a large annual distribution of money in wages. At present the suggestion of the existence of salt beds is regarded with optimism, and if they do there is big money in store for the fortunate finder.

Should no boring be done (which is very unlikely), a good profit can still be made with the company's new system of evaporation. Compared with the old pot and pan method, at least eight times the quantity of salt could be produced with the same amount of fuel, and it is claimed that the old method was a paying proposition.

WORLD'S GREATEST GOLD PRODUCER.— RECORD WORKING COSTS.

(Special to Canadian Mining Journal.)

The Robinson gold mine of the Rand, which achieved the wonderful record of producing £1,290,461 in gold and distributing £660,000 in dividends during 1907, has further distinguished itself by a reduction of working costs to a level below the most optimistic anticipations of a few years ago. During the recent period of financial distress, when yields and dividends have been steadily rising and the support of European investors as steadily weakening, there has been a call, one may say, a clamor, for cost reduction upon the Rand which has necessitated the sternest reorganization of methods. Wages have been reduced and in every department of work, technical and clerical, a standard of economy instituted before unknown. The demand for higher efficiency has been satisfied by modifications of metallurgical system of an order that is revolutionary for the Rand. By means of tube mills for regrinding the coarse mill products, stamp duties have been raised to 8 and 9 tons per diem and the gold recovery to 96 per cent. These figures are, of course, high above the field's average, but gradually the less efficient mines are being brought into line and the whole aspect of Rand metallurgical performances reflects the great industrial importance of the reform.

The tendencies of underground economy are yet difficult to foretell. Chinese labor is being rapidly repatriated; Kaffirs are now offering themselves for work in unwonted abundance. But the cloud of future uncertainties, owing to the variability of the native supply and the prospects of Government legislation extending to the systems of labor allocation underground, still hangs heavily upon the industrial horizon.

With a monthly total of ore milled of 1,350,000 tons, the Rand cannot speedily reflect changes of a current expenditure. The reduction has been slow. The average for the field has been gradually reduced to under 20 shillings per ton milled, which represents only 85 per cent. of the rock hoisted, owing to "waste" elimination at the head gears. Before the war, an average of 24 shillings per ton was recorded. Many companies, however, are now operating for 17, 16 and 15 shillings per ton, with a fair allowance for development charges.

The record was attained by the Robinson mine in December, 1907, when the total working expenditure touched 14s. 1.18d. per ton milled. I have been favored by Messrs. Eckstein & Company's Central Administration with a detailed analysis of expenditure, which stands as follows:—

(210 stamps ran 28.75 days, crushing 40,000 tons.)

	Cost per ton. s.	d.
Mining—		
General		7.22
Stoping	4	6.95
Timbering		3.81
Shovelling and tramming	1	4.73
Winding		9.39
Pumping		2.61
	7	10.71
Reduction—		
General		0.72
Ore sorting		3.09
Ore crushing		2.56
Ore transport		3.13
Stamp milling	1	3.68
Tube milling		4.31
Cyaniding pulp	1	2.15
Discharging residues		7.22
	4	2.86
General expenses—		
Mine		11.00
Head office		5.17
Development		7.44
Total working expenditure	14	1.18

The rock hoisted and delivered to the sorting station during the month totalled 48,460 tons, of which 8,560 (17.664 per cent.) were sorted out. The number of whites in the employ of the company was 319, and of natives 3,019; there were also 94 Cape boys and Indians.

Although the Robinson heads the list of gold producers, its crushing capacity is far below that of its nearest competitor, the Simmer and Jack. This mine, belonging to a different group, crushed, with its battery of 320 heads, 736,930 tons during 1907 for a yield of £1,187,634.

Small batteries no longer form part of the Rand's industrial designs. The joint Simmer East-Knights Deep mill is of 400 head capacity, that of the Crown Deep-Robinson Central Deep 300, and that of the Robinson Deep also 300 heads; all these with duties of 6, 7 and 8 tons per stamp per day.

A new mill is being erected for the Simmer Deep-Jupiter, of 300 stamps, which will be built mostly of steel and will employ stamps of 1,670 pounds weight, with mortar box allowance for an increase to 1,800 pounds. The sands and slimes vats to serve this plant will be no less than 50 feet and 70 feet respectively in diameter.

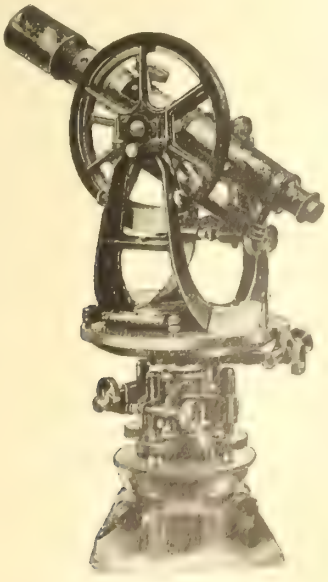
From such figures as the above can be learned the true significance of the Rand's modern policy of "large scale operations."

Ralph Stokes.

Johannesburg, February 20th, 1908.

A NEW THEODOLITE.

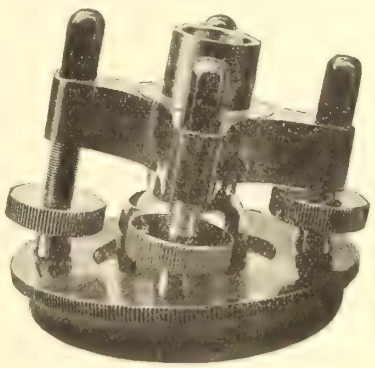
We show below an illustration of an improved theodolite recently placed on the market by Wm. Ainsworth & Sons, the well-known instrument makers, of Denver, Colorado.



The instrument is designated as their Type BU, and has ten inch twenty-five power telescope with one and one-fourth inch objective, five inch full vertical circle, guard and vernier reading to one minute, thirty seconds telescope level, stadial and gradienter five inch limb with verniers reading to one minute at 30 degrees angle with telescope.

The construction of the standard is such that it admits of placing a two and one-half inch compass in the centre, which answers very well for checking courses; most surveys now being made from a meridian established by solar observation; and for rigidity and permanence of alignment the U standard is far in advance of the usual construction.

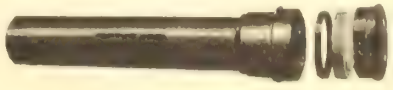
All clamp and tangents are of the gib type, which when properly constructed are superior to the split clamps formerly used, in that they do not carry the instrument off the line when clamping. The convenience of our limb and lower clamp and tangent screws can be appreciated from the illustration.



The principal parts are made of the hardest bronze alloys to limit gages and interchangeable to the highest degree; the makers guaranteeing that any of the parts excepting the limb, vernier plate and centre can be interchanged with other of their instruments of the same size without throwing the instrument out of collimation to exceed fifteen seconds.

One of the advantages resulting from the use of gages is shown by the leveling head, which cannot be cramped in any position, and whereas usually when leveling up an instrument it is necessary to loosen all four of the screws to prevent cramping, this is not the case where all parts are made accurately to gages and carefully inspected after each operation and before assembling. The cramping of the leveling head increase tenfold the wear on the leveling screws and on lighter construction occasionally cramps the centre, this being the greatest objection to the four screw or American type of leveling head by engineers.

Another of the excellent features of this instrument is the telescope construction, wherein accurate limit gages also play a very important part. The main telescope tube is finished inside and out by lapping, as is also the outside of the draw tube to within .0001 inch of standard dimensions. The inside of the objective head, the outside and inside of the lens cell and the periphery



of the objective are all of uniform diameter, true and accurate to within these limits. The makers guarantee these as well as other parts of the same size instrument to interchange with a resultant error in collimation of not to exceed the above amount.

EXCHANGES.

The Iron and Coal Trades Review, March 6th.—Commenting upon the mineral production of the United Kingdom in 1907, the *Review* has this to say: "During 1906 the upward movement of the market was slow and limited. It is true that in 1907 the continued and extraordinary expansion of trade had its effects upon prices, and coal became much dearer; but it must be remembered that the industries of the country generally had enjoyed a long term of unusual prosperity before the coal trade began to enter into its own."

Bulletin of the Imperial Institute, Vol. V., No. 4.—A highly instructive summary of the occurrences and uses of tantalum appears in this number of the *Bulletin.*

Metallic tantalum has come into prominence through the discovery of its suitability for the preparation of filaments for incandescent lamps. The commonest ores of tantalum are tantalite and columbite, which consist of tantalates and niobates of iron and managenes in varying proportions. Tantalite contains 84 per cent. of tantalum pentoxide, whilst columbite contains but little tantalum and is mainly composed of niobic pentoxide, a practically worthless and often detrimental constituent.

Tantalite is black in color, has a composition formulated thus (Fe, Mn) Ta_2O_6, in which manganese frequently replaces the iron, and tin, zirconium or niobic oxide takes the place of the tantalum. Streak is black, hardness 5 to 6.5, and specific gravity 6.5 to 7.3. It crystallizes in the orthohombic system.

There are many other tantalum-bearing minerals; but they are not of commercial importance.

Tantalum minerals are found principally in the eastern part of the United States; in the tin-bearing districts of the Northern Territory of South Australia; and in West Australia. The American minerals range from 18.20 per cent. to 78.20 per cent. tantalic pentoxide. South Australian samples show 41.70 per cent. and 55.52 per cent.; West Australian, 50.57 per cent. to 80.61 per cent.

The ores are bought on a basis of at least 60 per cent. of tantalic pentoxide. Niobium oxide should not exceed 3 per cent. Chromium should be entirely absent. The price is stated to be about 4s. 6d. per kilogram of ore.

Tantalum is extracted from its ores by means of conversion into the alkali fluoride, which is then acted upon by metallic sodium.

The pure metal melts at 2200 degrees C. Its hardness is 10 and its specific gravity 16.5 to 16.6. Although ordinarily ductile, under hammering it becomes extremely hard.

Its principal uses are its application as an incandescent filament and as an alloy. It has been proposed to use it in place of platinum for laboratory purposes. Since it is attacked by hydrofluoric acid and by fused alkali and since it oxidizes when heated in air its usefulness would be limited. However, it has the advantage of being unattacked by aqua regia.

The Journal of the Chemical, Metallurgical and Mining Society of South Africa, January, 1908.—Mr. W. A. Caldecott, B.A. F.C.S., has an article on Mexican silver ore treatment in this number of our South African contemporary. "Some Features of Silver Ore Treatment in Mexico" is the title of the paper. Part I., which appears in this issue, takes up "Works Practice."

Cheap power and the replacement of the old patio process by cyanide treatment have made the remarkable advance in Mexican silver ore treatment methods possible. Power is being transmitted as far as 170 miles and supplied at a cost of 30s. per horse-power per month, considerably less, the author notes, than the average cost of electric power on the Rand.

The patio process, invented at Pachuca by Bartolome de Medina in 1557, although still in operation, is mainly of historic interest. Cyanide leaching preceded by a chloridizing roast is also a thing of the past, as also is hyposulphite lixiviation.

Mexican unskilled labor is cheap, costing about 1s. 6d. per day; but its cheapness is offset by its irregularity. In the city of Mexico there is an electrolytic refinery for gold and silver bullion. The metric system is generally used in dealing with Mexican silver ores. Cyanide consumption is expressed in kilograms per metric ton of 1,000 kgm., or 2,204 lbs.; and silver or gold is reported in grams per metric ton.

Mexican silver ore is usualy a hard, flinty, quartz containing little extraneous base metal mineral. Silver occurs mostly as silver sulphide, associated at times with a little arsenic or antimony. Silver chloride and native silver are comparatively rare. A small but important amount of gold is found with the silver. As a rule the gold is more readily extracted by cyanide treatment than the silver, and thus it requires no special attention.

Fine grinding, cyanide treatment, decantation followed by mechanical filtering and zinc shaving precipitation are the essential features of modern Mexican practice.

The uniform dissemination of finely divided silver-bearing minerals in the ore render finer crushing necessary than is usual on the Rand. Stamps followed by tube mills represent the most advanced practice; but at a Guanajuato plant stamp milling alone with slotted screens equivalent to 45 meshes per linear inch, serves to slime the ore. This, however, reduces the duty per stamp to 2.7 tons per 24 hours. At Pachuca, stamps are followed by chilian mills crushing to 80 mesh.

The Mexico mill of El Oro Company is equipped with forty stamps and six 4 ft. x 20 ft. tube mills. The 16-mesh battery product from 200 tons of hard, flinty ore per day is reduced to a product, 90 per cent. of which passes a 200-mesh screen. Developments at this plant will go far towards determining whether making 50 per cent. to 75 per cent. slimes and corresponding quantities of hard and tough fine sands, or sliming all the ore is the most economical method. This hinges on the actual cost of all-sliming.

Trials are now proceeding in stamp milling without battery screening but with a high slot discharge on the lines of the old German schubersatz.

Amalgamated copper plates are not generally used in Mexican plants, but following the stamps and sometimes the regrinding appliances as well, Wilfley or other concentrators are employed. The concentrates are usually shipped to a smelter, together with a certain amount of hand-picked ore.

Sand is commonly separated in vats from the pulp, leaving the battery by Butters distributors, and long sand treatment is usual. The slow rate of solution of the cyanide renders lengthy agitation and aeration necessary in slime treatment.

In addition to the use of strong solution in slime treatment a good deal of lead acetate is added, varying from 4 ounces to 12 ounces per ton of dry slimes. The strong solutions used and the considerable weight of silver to be precipitated cause the employment of coarse zinc shavings, for which lead-coating is not needed, as the zinc-silver couple soon formed yields a high precipitating efficiency. For smelting the silver, often amounting to one ton per month at individual plants, crude oil furnaces are employed.

The cyanide consumption ranges from two to four pounds per ton of ore and the percentage recovery of silver from 70 to 90 per cent. A higher recovery of gold is made.

Ore treatment charges run from $1.95 to $3.00 per ton of ore.

PERSONAL AND GENERAL.

Mr. James Ross, president of the Dominion Coal Company, is at Atlantic City.

Mr. E. P. Earle, president of the Nipissing Mines Company, was in Ottawa recently.

Mr. W. A. Carlyle has completed his examination of Le Roi mine and is now returning to London, England, to report to the directors of the company.

Sir William Armstrong has been investigating the Sudbury nickel deposits to ascertain their value as a source of supply for the armor of war vessels.

Mr. E. C. Wood, of Spokane, is in Kamloops. Mr. Wood will resume his practice as a mining and civil engineer. He was formerly a resident of this city.

Mr. John Hayes Hammond, the noted mining engineer, who has been ill in San Francisco for some months, has now fully regained his health and will shortly return to the East.

Lieutenant-Governor Dunsmuir of British Columbia is negotiating with British capitalists for the sale of his Vancouver Island coal mines and other business interests, with a view of residing in England.

Boston capitalists have acquired from Mr. James Amess, of Vancouver, a dredging concession in the Fraser river near Lillooet and organized a close corporation to operate it under the title of the Boston Gold Mining Company.

Dr. Victor S. Clark, who has been traveling through Canada making a special investigation for the Washington Department of Commerce and Labor as to the workings of the Lemieux Industrial Disputes Act, was in Cobalt about the middle of last month.

Mr. B. A. C. Craig left Toronto on the 23rd March for Saskatchewan. He will be absent for some weeks. Mr. A. Crawford Craig is in Saskatchewan now. His brother will join him there. The two Messrs. Craigs are interested in the mineral deposits of the new province.

Prof. J. J. Thomson, of Cambridge, Eng., has been nominated by the Council of the British Asociation for the Advancement of Science as president of the meeting to be held at Winnipeg next year. He took his degree of D.Sc. from Dublin, Victoria and Columbia Universities and is a Ph.D. of Cracow. He became an F.R.S. in 1884 and is known as the author of several standard scientific works.

WATER IN GRANITE.

The very general belief that wells sunk in granite will get no water appears not unreasonable when we consider that granite is the hardest of rocks and that its surface outcrops are as a rule so free from pores or crevices through which water might circulate that the expectation of finding water by drilling would seem absurd. Within the last few years, however, the many succesful wells drilled in crystalline rocks have effectively proved the erroneous character of the old opinion.

The crystalline rocks, such as granites, gneisses, schists etc., like the sedimentary shales, limestones, and sandstones, carry water in their pores—the microscopic spaces between the grains of solid mineral matter; but while the sedimentary rocks may absorb several per cent of their volume in water—sandstones about 15 per cent, limestones 5 per cent, and shales 4 per cent—granites and other crystalline rocks rarely absorb water to more than one-half of 1 per cent of their volume, and the water in such rocks moves through the pores so slowly that it can never escape fast enough to be of value in wells. Fortunately, however, the crystalline rocks are traversed in various directions by many joints and crevices. An investigation of these joints shows two principal systems, one of which is nearly vertical and the other horizontal. The vertical joints, which may be hundreds of feet in length, while not at all regularly spaced, are usually 10 to 20 feet apart, trend in all directions, and may be inclined to the vertical at any angle up to 30 degrees. The distance between the horizontal or sheet joints, which approximately parallel the surface, varies from a few inches near the surface to many feet at a depth of several hundred feet below.

The nearly vertical joints serve as channels for the admission of water from the surface, while the sheet joints form reservoirs for its storage. As most of the joints are rather narrow, the amount of contained water is likely to be moderate, and the yield of wells in granite is seldom more than 10 gallons a minute, though some exceptional wells, pumped by steam, have yielded as much as 30 gallons a minute. Out of 72 successful wells in southern Maine only 2 yielded more than 50 gallons a minute.

The extreme irregularity of the joint systems makes the success of any well in granite a matter of chance. Of two wells drilled within 50 feet of each other, one may be a failure, the other a marked success. Records collected in southern Maine indicate that about 87 per cent of the wells drilled in granite supply water enough for ordinary domestic uses.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, 18th March, 1908.

Glace Bay is happy. Votes of thanks and congratulatory addresses have fallen around like "leaves on Vallambroso," and even on Friday, the thirteenth, the citizens of our smoky towns managed to smile. The Board of Conciliation made their award on the 12th of March, and it was accepted and signed by the representatives of the men and the general manager of the Coal Company on the following day. Although at no time during the negotiations between the Coal Company and their men was there any real fear of a strike, yet everybody is relieved at the removal of the incubus of uncertainty that has been with us since the end of November last. As stated in previous correspondence, the members of the Board were Prof. Adam Shortt, of Kingston University, Ontario, chairman; Dr. A. S. Kendall, M.P.P., men's representative, and J. Dix Fraser, of New Glasgow, the company's representative. The work of the Board commenced on Monday the 2nd, and it sat every day without intermission from 10 to 5 until the 10th. Professor Shortt proved an ideal chairman. The way in which he went to the heart of things evoked the admiration of all who were present at the sittings of the Board. His quick appreciation of fine technical points was remarkable. He quickly divested any disputed point of its haziness and laid the issue fair and square before the witnesses. Very evidently the professor has had considerable experience in work of this kind. Every little while he would treat the audience in the Council Chamber to a little dissertation on general principles, which he would proceed forthwith to apply with unerring directness to the particular point that then happened to be under consideration. It was soon seen that he could not be trifled with, and that it was impossible to lead him astray very far. Prof. Shortt carefully avoided any personal issue, and once or twice when signs of a little friction manifested themselves he made it very plain that such questions were entirely out of his province, and that all he was there for was to make as fair a settlement of wages as could be archieved. He was consistently courteous and impartially tactful, and possesses the happy knack of appearing to be deeply interested in every bit of evidence given.

The men presented their evidence in a very capable manner and in an eminently fair manner also. Their case was conducted by the Grand Secretary, John Moffatt; the Grand Master, Stephen B. MacNeil, and the Grand Outside Watch of the P. W. A., Sylvanus Nicholson, and these gentlemen proved themselves entirely worthy of the confidence reposed in them by the members of the P. W. A. Mr. Nicholson in particular proved himself to have quite extraordinary staying powers as a cross-examiner, and altogether the case of the men was presented with great ability.

The award of the Board confirmed the main features of Schedule No. 1 put into effect by the company on the 6th of January, with certain concessions to the men that mean an aggregate increase of about $70,000 per annum over the wages paid under the three years' contract. These increases are as follows: An increase to men in machine narrow work, to cover the increase to loaders and the increase in the price of powder. A scale of rates for mining coal in pillars graded according to the weight of the cover, which are an increase over the pillar rates under Schedule No. 1. The laboring rate remains at $1.52 according to Schedule 1, but an increase of two per cent. is given over Schedule 1 rates to boys, drivers and landing tenders, and to mine mechanics and shiftmen getting over $1.70 per day, bringing up the rate of skilled shift labor to $1.75 per day. The clauses relating to cross-cuts in pillars, and to wedging coal in pillars where the presence of gas rendered it unsafe to use powder which appeared in Schedule 1 were modified and simplified, as their former reading was a little ambiguous. The price of powder and house coal remains as under Schedule 1.

All agree that the award of the Board was a very fair one, and it will be seen that the differences between the men and the company were very small after all. The graded rates for pillar getting, while distinctly more favorable to the men, yet bear out the company's former contention as to the greater ease of mining pillars under deep cover compared with mining pillars under light cover. The settlement of the pillar cross cut question removes a constant source of friction and the uniform price for powder puts the sale of explosives on a more business-like footing than before.

The men and the company have agreed to the continuance of the rates of the award until 31st December, 1909, and we are therefore assured of at least two years of industrial quiet, which cannot but be of great benefit to every one concerned.

We think the P. W. A. are to be congratulated on their getting, and the Coal Company, on their ability to give, an increase of wages at the present time, when retrenchment and financial failure are of daily occurrence. We venture to think the miners of Glace Bay are about the only people on this continent who will get an increase of wages this year, unless all financial signs fail. We have no doubt, however, that the Coal Company will feel that freedom from labor troubles and the prospect of an uninterrupted two years of steady development are well purchased at the cost of the extra wages they are going to pay.

The Lemieux Act has certainly proved its worth as a means to conciliation, and once again we see that in many cases the differences between employer and employee are but slight, and more or less easily adjusted if an impartial tribunal, or rather a peacemaker, is available to bring them together. Men and masters are naturally more or less suspicious of each other and always seem to find it difficult to treat absolutely openly with each other. Whether we say the Lexieux Act is to be thanked or whether it is Professor Shortt that we owe our thanks to, we also think the easy settlement was largely due to the fact that there really was not much to fight in the Coal Company's Schedule 1, that it was very fair and very just.

An interesting visitor to the meetings was Dr. Clarke, a representative from President Roosevelt, who is interested in legislation for the States of a similar character to our Canadian Act. We think they need it.

We see that the Springhill lodges of the P. W. A. and one of the Cape Breton Lodges, namely, Olive Lodge of No. 3 Colliery of the Dominion Coal Company, have announced their intention to secede from the P. W. A. and join themselves to the United Mine Workers of America. "Whom the gods destroy, they first make made." Why should a Canadian labor organization wish to join hands with the union of men who belong to another nation, who live under laws other than their own. We think the condition of miners in Canada is quite as happy as that of the miners in the States. We wonder whether the men of Springhill ever have tried to realize what the Canadian nation is going to be some day? The miners of the States have evidently realized that, or why should they send their emissaries here to enlist Canadian in their forces? The ambassadors of John Mitchell are not consumed with anxiety for the welfare of Cape Breton or Nova Scotia. What they wish to do is to have a hold on the chief Canadian coal field, so that whenever they wish to force the hands of the coal operators in the States, they will be safe from Cape Breton coal imports to relieve the situation in their disfavor. The relations between the P. W. A. and the coal operators of Cape Breton have been almost patriarchal in their mildness. What other labor union in the world has its dues stopped through the colliery office? Some men are of the opinion that friendliness cannot exist between an organization of men and their employers.

and that capital and labor are necessarily and always antagonistic. They have a suspicion that mild relations mean weakness on their part, and that nothing is ever obtained without a show of hostility and a fight now and then. We venture to assert that they are woefully mistaken. Organization is as necessary to labor as it is to capital. If labor does not organize, it will suffer, and so will capital. But these organizations are not of necessity antagonistic, as a matter of fact it is trite to say that their interests are one and the same. Quite what benefit would ensue to the miners of Cape Breton if they threw over the P. W. A. and joined the U. M. W. A. we find it difficult to see. They might certainly pull somebody else's chestnuts out of the firt, but whose fingers would be burnt? We rather think the vote passed at Olive Lodge was a snap vote and did not represent the true feeling of the men there or anywhere else in Cape Breton. After the splendid fight put up by the Grand Officers of the P. W. A. before the Concilation Board we should think the men at Olive who listened to the smooth tongued orator from the States will feel rather ashamed of themselves. From what we have seen of the men of Cape Breton they do not need to go to the States for leaders, for they are quite capable of leading themselves. As a race the native miners of this Island are the equal of any miners anywhere. Their physique and their intelligence is above the ordinary, and their pawkiness and wise caution do not belie their Scots ancestry. We speak advisedly when we say that coal mining in Cape Breton is even *yet* only in its initial stages, and we think the Island can produce men with brawn enough to win the coal, and brains enough to see that they get paid for it.

The coal washery of the Dominion Coal Company, situated on the Sydney & Louisburg Railway near Port Morien, was completely destroyed by fire on the night of Sunday the 8th of March. The fire when first noticed by the watchman was only small, but owing to the dry and dusty nature of the surroundings it spread with great rapidity. The boiler house was speedily involved and the fires were drawn. This rendered the fire pump useless, and the firemen, who had speedily responded from Glace Bay, could not do much to check the flames. The loss is between $70,000 and $80,000, and is fully covered by insurance. The washer was an old one, of the Robinson-Ramsey type, and was used entierly for washing slack to supply the New England Gas & Coke Company, at Everett, Mass. The Gas Company will probably arrange to take dry coal unwashed for the present at any rate. The Coal Company will probably replace the Washery with a more modern plant, but the location is still undecided.

DOMINION COAL OUTPUTS FROM MARCH 1st to 14th, 1908.

No. 1	22,276
No. 2	32,317
No. 3	14,440
No. 4	20,303
No. 5	23,962
No. 6	10,375
No. 7	3,515
No. 8	7,333
No. 9	15,402
No. 10	6,057
	155,980

ONTARIO.

Cobalt:—

Queen Alexandra.—This property, which is situated on the east shore of Cross Lake, has been sold to some Toledo, Ohio, people, represented by Mr. Mowery.

Silver Leaf.—The shaft is down 100 feet. The vein is from 6 to 13 inches in width in the bottom. It is very high grade ore. About 16 sacks of ore are filled daily.

Kerr Lake Crown Reserve.—The showing here cintinues as rich as ever. It is the intention of the management to contiue the cut until two carloads of ore are ready for shipment, and then start sinking a shaft. Their No. 1 ore will run over ten thousand ounces to the ton.

North Cobalt Mine.—Work has been discontinued here for the present.

Silver Queen.—The annual meeting of the shareholders will be held on May 1st. It is likely that a payment of annual dividend will be announced.

McKinley-Darragh.—Three cars of low grade ore have been shippeds so far, this month. This ore, which will run about 200 ounces, goes to the Pennsylvania Smelting Company.

O'Brien Mine.—There are 120 men at work here. No. 1 shaft is down 325 feet; No. 2, 90 feet and No. 6, 150 feet.

Provincial.—This mine has joined the list of shippers and sent out fifty thousand pounds of ore t oDeloro, last week.

Lorraine Township:—

Silver King Mine.—The annual meeting of the Silver King Mining Company was held in Haileybury on the 17th inst. Twelve men are at work on the property owned by this company.

The Haileybury Silver Mining Company.—The shaft on the property owned by this company is down 40 feet. A boiler, hoist and pump are being installed. 15 tons of ore have been sacked.

Mr. Pete Farrar, of New Liskeard, has bought two diamond drill outfits an dis sending one in to the Larder Lake district and one to Abitibi.

Hydraulic Compressed Air Company.—25 men are at work here. Two shafts are being sunk, one 11 feet in diameter and one 21 feet in diameter. The former is now down 60 feet and the latter 20 feet. They are to be sunk 430 and 340 feet, respectively. A 13-drill Sullivan air compressor, driven by water power, supplies air for the machine drills.

Montreal River.—Mr. Chas. Gifford has purchased a steam plant, consisting of boiler, hoist and pump and has sent them up to his property on the Montreal River. His property is looking very well. This is the first steam plant to go into this district.

The shipments from Cobalt, for the week ending March 14th, were the heaviest in the camp's history, amounting to 870,720 pounds.

The following were the shippers:—

	Pounds.
O'Brien, to Deloro	125,280
La Rose, to Denver, Col.	197,400
Mckinley-Darragh, to Carnegia, Pa.	189,660
Cobalt Central, to Copper Cliff	49,700
Nipissing, to Copper Cliff	63,000
Watts, to New York	52,730
Buffalo, to Denver, Col.	42,740
Right of Way, to Deloro	60,210
Provincial, to Deloro	50,000
J. Rowland, to Toronto (experimental)	40,000

A Cobalt correspondent has very kindly sent us the following account of a drill trial in that camp. It is worth careful persual.

"I yesterday witnessed an interesting test of a new Sullivan Air Hammer Drill, of which I though you would like a note:—

Drilling Test at Right of Way Mine, Cobalt, Ont.

17th of March.

"Drill used, Sullivan D.21, Air Hammer type.

"The hole was a dry back hole, in a drift, at a slope of about 75, and wes in hard conglomerate rock all the way. Drill was set up on a tie in the track.

"Time taken to set up after connections were made, was 20 seconds. The time consumed from the starting of drilling till the test was completed, was 18 minutes.

"The length of hole drilled, was 5 feet 4 1-2 inches.

"Five pieces of dril lsteel were used and the time for each was as follows:—

	Minutes.	Minutes.
1st drill	0—4	4
2nd drill	4—7	3
3rd drill	7—11	4
4th drill	11—15	4
5th drill	15—18	3
		18

"Time consumed in changing drills is included in above and was from 15—20 seconds for each change.

"The cuttings feel from the hole in a steady stream and the air in the vicinity of the drill was not nearly so dusty as would have been the case with an ordinary percussion drill."

GENERAL MINING NEWS

NOVA SCOTIA.

Sydney Mines.—The Nova Scotia Steel & Coal Company has notified its employees that, unless the steel market improves, a reduction of 10 per cent. in the wages of all employees receiving more than $1.50 per day will go into effect on May 1st.

Port Hood.—That the Port Hood explosion was due to gross neglect on the part of persons unspecified is the finding of the committee, Messrs. Moffatt, Moss and Scully, appointed by the Local Government to investigate into the disaster. The committee's report reads as follows:—

Hon. Christopher Chisholm,

Commissioner of Public Works and Mines,

Halifax, N.S.

Dear Sir,—

Having received authority through Attorney-General W. T. Pipes, we went to Port Hood on Monday, February 10th, or three days after the explosion. In company with Deputy Inspector Nicholson and Manager McLennan, we entered the mine on the following morning, going down the main slope to No. 3 landing. After travelling to No. 3 level north to the face, we returned and went into No. 4 slant, passing No. 3 balance on No. 3 level south. The mine is well aired and well timbered, the levels being clean and in good condition.

On our way into No. 3 level, we noticed a thin skin of ice at the landing where the ventilation was in full play. The face of No. 3 elvel is said to be 1,800 feet from the main slope. On passing through the level door we were met by unmistakable evidence of a gas or coal dust explosion. A heavy smell filled the level from the door to the face, and for those of us who has experience in mine explosions there was no doubt as to what had taken place, although there was nothing in the appearance of that part of the level to indicate an explosion.

Nearing No. 3 slant, however, we noticed debris scattered over the roadway, and were informed by the manager that for some distance outside of No. 3 slant the road had been cleaned up to permit of the easy running of a tram, which conveyed the dead bodies to the bottom, and to take back material to restore the ventilation. Between No. 3 slant and No. 3 balance we passed over two small falls of roof rock, and noted that nearly all the timber and material which had been lying alongside the level had been moved out of position and tossed about in all shapes, most of it close to the low side of the rib.

All the stopings but one between No. 4 slant and No. 3 slant had been blown out downwards, but were replaced by brattice. On reaching No. 3 balance we went up to the face a distance of 150 feet and made a close examination of everything there. At the foot of the back balance numbers of hand picks were strewn around, and farther up parts of stemming gear were seen lying in the middle of the place. Passing through the upper crosscut, we went down it. There were no signs of disturbances in these places, except on the bottom at the level; even the sight strings were not burnt. Going in towards No. 4 slant, we passed the place where the five men on the high level were found dead.

The position of the bodies as they were found was explained to us by the manager. Inside of No. 3 balance stood an empty box on the track, while tools, timber and other material were strewn promescuously around. No. 4 slant is 28 feet from the face of the upper and 46 feet from the face of the lower level. The bottom of the slant was filled up within three feet of the roof with coal and other materials, tools, such as shovels and picks, being partly buried. Some of the picks were fastened by the rope with which the miner generally carries his piece and powder cans, showing that these men were only going in to work, and were just on the way there when the explosion occurred, as five of the bodies were picked up at this spot. Inside of the slant towards the face of the level two booms were down, having been blown down by the force of the explosion. The bottom of the lower level at the foot of the slant was considerably torn and disturbed. Leaving the south side, we again entered No. 3 north level, and travelled the inside balance, making an examination of the bords. These were found in very good condition, the roof well timbered, free ventilation, and no gas.

Not being satisfied with the thoroughness of the investigation of the first day, we requested the manager to go into the mine with us on the following morning, which he did. We went into No. 3 balance, south carefully noting things as we proceeded. Nearing the back head, boots were found which had been blown out towards the slope a distance of forty feet. A full can of powder was found on the high side, the can seeming to be in fair condition, and but little injured by the explosion. A miner's jumper and a vest with a watch in the pocket was also picked up. The watch had stopped at 8.45. To ascertain whether it had been stopped by the sudden concussion of the explosion, we wound it up, giving twenty half turns of the stem. From this we gathered but little information as to the exact time the explosion had occurred, for it was evident the watch had run down. It was undamaged, as it started to go as soon as wound up. We again examined No. 3 back head and balance, went into the faces of the

upper and lower level, turned and travelled out the lower level to No. 3 slant. This level was in much better condition than the upper level, being free from falls of rock, although debris was scattered along it out to the slant. So far as we could gather from the condition of the mine, the explosion was not a violent one.

The nature of the explosion is undoubtedly one of gas. It occurred in the back head and balance, from which it scattered in all directions, the most of its force having been exerted along the upper level for a distance of 400 feet, and in No. 4 slant extending out the lower level a distance of 400 feet. The reasons for our conclusions are:—

1st.—That the heavy smell in that section of the mine is that usually caused by an explosion of gas or gas and coal dust combined.

2nd.—That the dust of the mine is too heavy to be suspended in the air (and if there were sufficient quantity of it as there is not) by the concussion of a blown out or a heavy shock. Evidence is wanting that a shot was fired at all.

3rd.—That no coking substance was found on the props or roadways as is usually found after coal dust explosions.

4th.—That there was no other element present to cause such an explosion as occurred there.

5th.—There is evidence showing that gas in quantity had been found in the balance.

That it occurred in the back head and balance seems more plausible and reasonable than to say it occurred in the lower level, because if any door was left open by which the air could take a short circuit it was No. 3 slant door. If this door had been left open naturally the air was cut off from the levels. There was gas in the balance and in the back head. If all four places, the upper and lower levels, the balance and back head, were full of gas set off in the lower levels it would certainly have reached the other three places, causing a tremendous explosion.

But as the effect of the explosion does not point to great violence, this theory must be discarded. It is more reasonable, however, to suppose that gas could have gathered in the balance and back head, owing to the knocking down of the brattice on the level between these places, and that this gas was the cause of explosion, the quantity being much less than from the four places combined, and there is evidence to show that the brattice between the balance and back balance was down.

As to how the explosion occurred, whether set off by a naked light, fired by powder from a can or shot, no one will ever be able to tell, as all in that section of the mine were killed.

In presenting this report we thank the Department for extending the authority which enabled us to fully investigate the cause of the explosion, and obtain information which may lead to prevention of similar disasters in the future.

John Moffatt,
Jos. Moss,
Thos. Scully.

Annapolis.—Messrs. J. J. Drummond, Selkirk, and Strong visited Annapolis recently for the purpose of selecting a site for an ore shipping pier for handling the Nictaux and Torbrook iron ore.

NEW BRUNSWICK.

If present indications are correct, the Northwest Miramichi will be the scene of an iron mining industry giving employment to a large number of men.

Messrs. James Robinson, Millerton; John Ferguson and W. E. Fish, Newcastle, and F. M. Tweedie and R. A. Lawlor, Chatham, are seeking incorporation as the New Brunswick Iron Mines Company, Limited, with a capital of $49,500. The chief place of business will be at Newcastle, but the company are seeking power to engage in mining, etc., in all parts of the province. It is generally understood, however, that the company has been organized with a view to the development of the rich iron ore deposits on the Northwest Miramichi, which are said to be equally as valuable as the Gloucester mine now being developed.

Mr. Ferguson, of Newcastle, has for several years been trying to bring the valuable property to the attention of capitalists, and the opening of the Gloucester mine, which adjoins the property held by the new company, has at length directed the attention of interested parties to the north shore.

It is stated also that the development of the property referred to will be carried forward on a large scale.

T. M. Burns, ex-M.P.P. of Bathurst, who was in St. John recently, stated that the work of the Gloucester iron deposits was still in progress. A surveying party of the Londonderry Iron Company were on the ground making surveys, he added, and the Intercolonial engineers who had been looking over the ground preparatory to building spur lines from the main line to tap the iron fields have completed their work. It is the intention of the promotors to begin mining as soon as possible in the spring, and there is no indication that they will change their intention.

There has been a good demand for the stock of the St. John Iron Company since the Dominion Iron & Steel Company entered upon the development of the Lepreaux iron deposits, but those who can afford to hold on to their stock refuse to sell.

The operations at present are limited to borings with the object of making a thorough testing of the deposit. It is hoped that by the early part of June that there will be about a hundred men at work. The Dominion Iron & Steel Company are confident as to the value of the property and will, it is expected, expend a great deal of money on its development during the approaching summer.

The plaster quarries of the Albert Manufacturing Company of Hillsboro' have closed down for a couple of months, owing to the dullness of the American markets, incident to election year. About 300 men will be temporarily out of employment. The management hope to resume operations in May.

ALBERTA.

Lethbridge.

It has been rumored for some time past that F. H. Sherman, president of District 18 U. M. W. of A., will run for the Provincial Parliament in the Pincher Creek district at the next election.

The report has, however, been officially denied by Mr. Sherman in the Fernie *District Ledger*.

The *Ledger* states there is no Labor party in Alberta, as the labor unions have declared for Socialism, and that at present active measures are being taken to organize the Socialistic party in many of the industrial centres.

Frank.

The following resolution was passed by the Frank local union No. 1263 of the United Mine Workers of America:—

"That, whereas three hundred miners and mine laborers have been idle since December 31, 1907, owing to the closing down of the Canadian American Coal & Coke Company's mines at Frank, Alta., thus cutting off the only means of support for ourselves, our wives and families, and whereas we have utterly failed to

obtain employment and are in consequence forced to depend on charity, owing to our wages being insufficient for us to save money to keep our families in times of depression;

"Therefore be it resolved that we make an appeal to the Provincial Government of the province to open up some public work for the purpose of providing us with an opportunity of earning an honest living for ourselves and families, and be it further resolved that copies of this resolution be sent to the Prime Minister of the province, to Mr. J. Marcellus, our local member, and to the press.

"(Signed) Geo. Nichol, Secretary."

Blairmore.

The third meeting of the joint committee of the Western Coal Operators' Association was held at Blairmore on March 10 and 11. The following gentlemen represented the Western Coal Operators: Mr. Hurd, general manager of the Crow's Nest Pass Coal Company; Mr. Stockett, general manager of Bankhead Mines, Limited; Mr. H. W. McNeil superintendent McNeill Company, Canmore. Representing District 18, U. M. W. of A.: A. J. MacDonald, Blairmore, Alta; W. Graham, Coleman, Alta.; W. Davis, Michel, B.C.

The following decisions were arrived at: In the matter of the claim that the lampmen at Michel be paid $2.62½ per day, and in the matter of the lampmen at Coal Creek.

The joint committee of the Western Coal Operators' Association and District 18 of the United Mine Workers of America have decided that Michel lampmen be paid $2.62½ per day, and the Coal Creek lampmen be left to the management of the company to deal with.

Lewis Stockett, President.
A. J. McDonald, Secretary.

In the matter of the International Coal & Coke Company, in respect to proposed new work at the Coleman mine, the joint committee of the Western Coal Operators' Association and District 18 of the United Mine Workers of America is of the opinion that the agreement under which we are working specifically provides that new work must be in actual operation before any contract price is established for the same and until such price is established all men shall be paid the day wage scale, and that therefore the International Coal & Coke Company be advised to establish the new work before bringing the question of new prices for the same before this committee.

Lewis Stockett, President.
J. A. McDonald, Secretary.

Strathcona.

Although work has been going on smoothly in the Strathcona mine since a dispute was settled some time ago under the Lemieux Act, friction has again arisen.

Owing to the low price of coal the company met the men and asked for a reduction in the mining price. The men would not grant this reduction, so the Strathcona Coal Company shut the mine down, paid off the men and did not open again till they got a small force of non-union men to start work on the reduced rate. The miners claim the Company has broken the agreement entered into some time ago, and have been distributing hand bills setting out their grievances. The bills circulated by the miners read as follows:—

NOTICE TO MINERS, MINE LABORERS AND OTHERS.

We request you to keep away from the Strathcona mine for the following reasons:—

In December last the United Mine Workers of America signed an agreement with the Strathcona Coal Company before the investigation board appointed by the Dominion Government, which agreement went into force on the 23rd December, 1907.

The company now refuses to abide by its contract and insists upon a reduction in wages from 33 1-2 cents to 28 cents, and threatens further to reduce wages to 25 cents per car for mining coal.

Furthermore, they refuse to pay the District scale for any work whatsoever and have failed to pay us our wages at all for near two months.

We now refuse to work until the company keeps its agreement with us. Kindly keep away from the Strathcona Coal Company's mine pending the settlement of this dispute.

By order of District 18 United Mine Workers of America.

Edmonton.

Several important amendments were made to the coal mines regulations during the recent session of the Provincial Parliament.

One of these amendments was to the effect that no boy under 16 years of age shall be employed in any mine underground, but making exception for boys already employed underground although not 16 years of age. No boy under 12 years of age shall be employed at any mine above ground, and boys under 16 years who are employed above ground must be able to read and write and have a knowledge of elementary arithmetic.

The section of the Act relating to the distance between shafts or outlets has been amended so that such shafts or outlets must not at any point be nearer to each other than 100 feet. This amendment is in accordance with the recommendation of the recent Royal Commission on the coal mining industry in the province.

The section relating to the qualifications required for mine managers has been amended so that a candidate for a mine manager's certificate must have at least five years' practical experience in a mine and be at least twenty-three years of age. Candidates possessing a degree or diploma in scientific or mining training only requires three years' practical experience, however. Candidates for pit boss and fire boss certificates must have three years' practical experience in a mine and be twenty-three years of age.

The section relating to the appointment of check-weighers is amended by making it compulsory for the owners of the mine to withhold from the wages of the miners employing this check-weigher a pro rata amount sufficient to meet the wages due the check-weigher.

Owners of coal mines are required to make certain returns to the Minister of Public Works before the 21st day of January in each year. Such returns are required to show the amount of coal mined during the previous year and the number of men employed at the mines.

The Act is amended so that after each visit to a mine the Inspector of Mines must post a synopsis of his report in some conspicuous place near the mine.

In mines in which gas has been found within the previous 12 months then a fire boss appointed for the purpose must examine the mine with a safety lamp immediately before the commencement of work in each shift, and must make a written report on the condition of the mine before men are allowed to enter.

It is also made illegal where safety lamps are used for anyone to unlock a safety lamp or to have matches or any smoking material whatsoever in his possession in the mine, and where safety lamps are used in a mine open lights may not be used between the place where the safety lamps are used and the main return airways.

With regard to blasting in a mine, the owner of the mine must provide some non-inflammable material such as clay for the men

to stem their shot holes with. It is illegal to use in any one shot any two classes of grades or qualities of explosives.

In mines in which safety lamps are required to be used no person but a shot-lighter holding a certificate under the Act may fire shots. It is the duty of this shot-lighter before firing any shot to examine the shot hole and see that the right quantity and quality of explosive is used, and also to see that there is no gas present.

If inflammable gas has been found in a mine the shot shall not be fired till the gas is removed or unless the explosive employed in firing the shot is so used with water or other contrivance as to prevent it inflaming gas or is of such a nature that it cannot inflame gas.

If the place where the shot is to be fired is dry and dusty then the shot shall not be fired unless the place of firing and all contiguous accessible places within a radius of twenty yards are in a wet state from watering or unless some safety explosive is used.

Explosives are not to be thawed underground, but the owner of every mine must provide a suitable thawing apparatus on the surface at each mine.

An important amendment is to the effect that a suitable supply of timber shall be constantly kept in each working place as near the face as practicable and in no case further away than the nearest cross-cut to the working face or other convenient place in the vicinity thereof.

The owner of a mine when more than 20 men are employed is required to furnish a washroom for the men.

When a committee of the men employed in the mine make an examination of such mine as they are allowed to do by law, then, so one of the amendments reads, should such committee report the existence, or apprehended existence of any danger, it is the duty of the owner of the mine to send a copy of the committee's report to the inspector of the district.

The books, such as fire boss report books, etc., required to be kept at a mine, must be furnished by the mine owner and by an amendment any person employed in the mine can examine these report books, or anyone having the written authority of anyone employed in the mine can examine the said report books.

The above are the chief amendments to the Coal Mines Act, and ought to prove beneficial to the welfare of employer and employee alike.

The amendments dealing with blasting in gaseous or in dusty mines are certainly of great importance, and if rigidly enforced will go a long way to prevent explosions.

SASKATCHEWAN.

Taylorton.

The dispute which has been going on for some time past between the employees of the Manitoba & Saskatchewan Coal Company at Bienfait and the company reached a climax when the employees, 50 in number, asked the Labor Department at Ottawa for a board of investigation to be convened to enquire into the hours of work and rate of wages. The employees, who are members of the United Mine Workers of America, have nominated F. H. Sherman as their representative on the board. The date of the investigation is not yet fixed.

Saskatoon.

The work at Eagle Lake which has been undertaken by the Government of the Province, to prove the coal deposits in that district, has only been a partial success. While coal was undoubtedly found, yet the seam was thin and was split in two by a clay band. Considerable difficulty was also experienced in mining the coal, as the roof was a soft clay which made timbering very difficult. On the whole the property did not come up to expectations, but work is still going ahead and better conditions may yet be found.

ONTARIO.

Cobalt.—The Little Nipissing will soon become a shipper.

In the past five months, under the management of Superintendent Houston, the Right of Way has done 800 feet of crosscutting and drifting and 150 feet of sinking. Four drills are working.

On the Drummond mine thirty-six men are working. Three drills are on double shift. At the Jacobs ninety-two are employed and between nine and ten drills are kept in commission. The old No. 3 shaft is down 300 feet.

Deseronto.—The furnace of the Deseronto Iron Company is temporarily closed on account of transportation difficulties.

BRITISH COLUMBIA.

Vancouver.—On the Fraser river, near Lillooet, a dredging concession of three and one-half miles has been acquired by American interests. A dredge, to cost about $75,000, will be built this summer.

Trail.—The shipment to Hong Kong during the second week of March of 140,000 ounces of silver from the Consolidated Mining & Smelting Company's plant at Trail brings the shipments of silver from this plant for the past six months to over one million ounces. Nearly half of this has gone to the Canadian mint at Ottawa. All gold from this plant is now shipped to the assay office at Seattle and from there to the various branch mints of the United States. So soon as the Canadian mint is ready for gold, the Trail smelter and refinery is able to supply it, so that the output of the Canadian mint will be almost entirely from the Trail plant. Between fifty and sixty tons of lead are produced daily, most of which is shipped to the Orient. The company is ready to blow in the largest copper furnace in Canada, and a new crusher has been added, which crushes and samples the full tonnage in one instead of three eight-hour shifts. It is estimated that the sales of copper throughout the United States were sixty million pounds during the past three weeks, and that approximately every pound of copper above ground has been sold. The present price of copper represents only about the average cost of production. Lake coppe ris quoted at 12 1-4 cents and 12 5-8 cents, and electrolytic at 12 1-4 cents and 12 3-8 cents. Lake copper is copper which does not require refining, and is supposed, also, to be of superior quality. Electrolytic copper, as is known, is the general copper refined by electrolytic methods. It will be interesting to note the cost of producing copper in various localities. At Lake Superior it costs 9 1-2 cents a pound; at Butte, 10 1-2 cents; at Bisbee, Ariz., the cost is only 8 1-2 cents; while at Globe, Clifton and Morenci, Ariz., it costs 12 cents. At Cananea, Mexico, 13 cents is the cost of production.

Nelson.—Work has been resumed in the Queen Victoria mine. J. P. Swedeberg is in charge. Mr. Swedeberg owns the property.

Victoria.—Mr. H. C. Brewster (Alberni) has introduced a bill into the Provincial Legislature which is designed to protect miners employed on properties operated by other than the owner. Speculators often bond mining properties from owners and commence operations for the limited period specified in the bond. As the miners have always two weeks' pay coming to them, the operator, if unsuccessful in floating a company, often disappears and leaves the men unpaid. In these cases there is no one to be held responsible. Mr. Brewster's bill aims at removing this abuse. It proposes to force the operator to deposit in a bank a sum sufficient to meet the wage requirements. Failure on the part of the operator to comply with this should be sufficient warn-

ing to the workmen. The provision reads as follows: "Whenever any operator shall employ any miner in or about a mine, such operator shall, within ten days from the time he first begins to operate or work such mine cause to be posted up in a conspicuous place at such mine, where it may be seen and read by the miners, a certificate signed by the manager of a branch within British Columbia of some chartered Canadian bank, certifying that such bank holds or becomes responsible for a specified sum of money, to be used so far as necessary to pay the wages of miners employed at the mine by the operator; such certificate may be replaced or supplemented from time to time by another. Each certificate shall be posted up as aforesaid at the mine within fifteen days of its date, and the specified sum therein mentioned shall not be less than will at any time thereafter pay all the wages then owing miners for work at the mine, and that may be earned by the miners then working there until the next regular monthly or other pay day, and for and during another month after such pay day." The liability of the bank, the operator, and the workmen, is fully defined and the form of the bank certificate is provided. It is further provided that any miner may in writing relinquish his rights under this Act. He may also after fifteen days' notice in writing resume those rights. It is made unlawful for an operator to incur a greater liability in wages to the miners than the sum mentioned in the bank's certificate.

Rossland.—The mines of the south belt of Rossland are enjoying a modest boom. Sunset No. 2 and Homestake are to be worked under lease.

A. B. Perry and G. G. Wilson have leased the O. K. mine and mill. Mining will be begun at once. The mine is on the south slope of the O. K. Mountain, two and a half miles west of Rossland and a quarter of a mile from the Red Mountain railway loop. The mill is a ten-stamp one.

Cranbrook.—The Sullivan smelter at Marysville and the Kimberly mines have closed down indefinitely. Operating difficulties and not financial strengency caused the cessation of work.

Rossland.

The Rossland mines are shipping from 5,600 to 5,800 tons of ore per week and up to the 17th of March had shipped 61,571 tons for the year. The shaft at the Centre Star will be deepened a couple of hundred feet in the near future. This would give them a depth on the dip of the ledge of 2,400 feet. The workings of the big mines here should soon pierce and cross the permanent water line, and it is hoped that when this is done the long looked for zone of second enrichment will be discovered. The lessees of the Blue Bird have installed a small drilling plant, and the mine is looking better every day. The Canadian Goldfields Syndicate has leased the Sunset to some local miners. The O. K. mine, a pockety, free gold property, to the west of the camp, has also been leased. Mr. W. A. Carlyle has finished his examination of the Le Roi mine and is now en route to London, where he will make his report. The smelter at trail has just completed the installation of the largest copper furnace in the Dominion. It has a capacity of 500 tons per day of ore and flux. The Trail refinery has shipped another 140,000 ounces of fine silver to Hong Kong. It is suggested here that arrangements may be made to treat some of the Cobalt low grade ore at British Columbia smelters. Some of our mining men seem to think the idea feasible, if proper freight rates could be obtained, as the ore would no doubt be valuable as a flux.

Boundary.

While the Granby is occupying a lone position on the Boundary shipping list, still, it is giving a good account of itself and is making new records weekly and then surpassing even the new ones. During the last week they shipped nearly 25,000 tons of ore to the Grand Forks smelter, taxing the capacity of that plant to its limit. The Phoenix mines shipped 80,155 tons of ore to the smelter during February, which was 6,000 tons more than they handled in January. One good feature of the situation is a plentiful supply of coke, cars, labor, etc. It takes four giant machines to crush the 33,000 tons of ore that is sent out daily, one of which, with a receiving capacity of 42 inches by 30 inches, is capable of crushing 150 tons per hour, if need be. On Friday, the 13th, the company exceeded all previous daily records and forwarded 4,005 tons down the hill. Up to the 14th of March the total for the year was 194,187 tons shipped by Granby.

While the Granby smelter is the third largest in the world, it is to be further enlarged, and by next fall will have a capacity of 4,500 tons per day. The blast furnaces, convertor plant, convertor building and blowing engine plant will be augmented and the additions will cost about $2,000 before they are all made. The machinery is now on order and is to be delivered before July 1st. In part it will consist of two Connersville blowers of 30,000 feet capacity each, four 150 Canadian Westinghouse motors to drive them, and a 500 Nordberg blowing engine, of a capacity of 10,000 cubic feet free air per minute to 15 pounds pressure.

Some additions will be made to the smelting plant of the Dominion Copper Company before work is resumed. The new machinery which has just arrived at the British Columbia Copper Company's Mother Lode mine is being installed and will be all ready to start up when the time comes to go back to work. A Spokane enterprise will expend $10,000 on a dredge to work on Granite Creek. They claim they can work the ground to bedrock and make it pay. These grounds were worked profitably in the early days of 1886-7. The Sally mine at West Fork has shipped another car of ore to Trail smelter. Comments have been made on the selling in New York of Dominion Copper 6 per cent. bonds at $45. At this price the returns are 13 per cent. The company has several hundred thousand dollars in the treasury. The New York office of the Granby Company have decided to pass the quarterly dividend, and as a consequence the shareholders here are not likely to receive any more cheques until copper climbs a little. Only 768,000 pounds of copper were shipped into the States this year in January, whereas 2,410,116 were sent over the line in the same month during 1907.

Slocan—E. Kootenay.

Nothing new has developed in the closing down of the Sullivan mine and smelter in consequence of the recalcitrant zinc in the ore and other troubles. The minority shareholders are holding a meeting in Spokane March 19th for the purpose of discussing the best means of protecting their interests should the mortgagees take action. A strike of good ore is reported from the Flint mine. The ore in the Granite, near Nelson, is improving with depth. Diamond drilling is in progress at the St. Eugene mine, Moyie. Their pay roll for February amounted to $35,000.

Crow's Nest.

The International, Alberta, Galbraith, Royal and Crow's Nest Pass coal mines continue to operate steadily. The Crow's Nest Pass Coal Company mined 9.81931 tons of coal in 1907, as against 213,295 tons in 1906, showing a material increase in production. The pay roll at their mines averages $185,236 per month.

Coast, Etc.

The Monarch mine at Field continues to work. While this company is working under difficulties, still they state the proposition is paying its way. While no great rush is expected into the Findlay river country, good reports are received by men coming out of there, and they state that it is a rich section. It is generally conceded that it is a little early yet, though, to go into that district. The best route is via Hazelton, and that is the trail most used at the present time. Boston capitalists are going to expend a large sum for a gold dredging plant to be used on the Fraser river near Lillooet this season. The sand and gravel

in that particular vicinity is difficult to treat and several companies have failed in their attempts, but this concern is satisfied that they can solve the problem with an up-to-date machine.

General conditions throughout British Columbia are looking very sunny when everything is taken into consideration. While several of the big mines, both metal and coal, are closed down, a slight advance in the price of copper will mean the resumption of work and no doubt early summer will see the situation considerably changed unless other troubles crop up. Considerable money will be spent for railway work in this country, including the big contract for the Western end of the Grand Trunk Pacific, which should help to a great extent.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Twenty-six miners lost their lives by the breaking out of fire in the Hemstead colliery, near Birmingham, on March 4th. Great efforts were made to rescue them, the work being continued for several days. The rescue apparatus, which was put to a practical test for the first time, proved ineffective, and one of the rescue party was sucocated by the fumes.

The Glamorgan colliery has been purchased by the Cambrian Colliery Company for £240,000. This is believed to be a preliminary step in the direction of a large combination of enterprises in connection with the coal export trade.

RUSSIA.

The quantity of copper smelted in the Ural district in 1907 was much in excess of the output of any preceding year. It amounted to 434,918 poods of metallic copper as against 260,788 poods in 1906.

Attention is being directed to the Altai asbestos deposits, which have been found to be of fine quality. The principal source of supply at present is in the Urals, but it is claimed that owing to more favorable topographical conditions the first cost of the product in the Altai district will be 50 per cent. less than at the Ural mines.

GERMANY.

A German zinc syndicate was organized at a recent meeting of owners of zinc works, which aims at the regulation of production, sales and prices for the next three years. It includes all the German producers with one exception.

Official statistics give the total production of coal in 1907 at 143,222,886 tons.

FRANCE.

The total production in mineral combustibles for 1907 was 36,930,250 tons, of which 764,861 tons was lignite. The increase over 1906 was 2,733,865 tons.

AUSTRALASIA.

The coal industry of Queensland, Australia, has received a stimulus owing to the operators having obtained a contract for 60,000 tons for the United States navy at Manila.

Explorations by the State Mines Department in the Powlett River district, Victoria, have resulted in the discovery of a seam of good coal four feet thick at a depth of 495 feet. Two other seams each one foot nine inches thick were pierced at lower levels. It is believed that the Powlett River district is much more extensiv than has hitherto been supposed.

Owing to the high price of tin there is great activity in tin dredging in the Emmaville district, New South Wales. Four dredging plants are in successful operation, and one company is preparing to spend £100,000 in development.

In Ballarat, Victoria, a company has been organized headed by the Mayor, and has taken up 200 acres of land in the heart of the city to prospect some of the quartz lodes.

SOUTH AFRICA.

Owing to the slump in the demand for diamonds, it has been decided to close down the Du Toits Pan diamond mine, Cape Colony, which is part of the De Beers property, on April 24th, until the market improves.

The outlook for the mining industry in Rhodesia is promising except for the scarcity of native labor. The gold output of Southern Rhodesia for January was 50,521 ounces. There are 175 gold producing mines, of which 129 produced fine gold during the month. The total January output of minerals was valued at £201,508.

The proposed new gold law of the Transvaal places considerable limitations on prospecting and the holding of claims which are not worked. The mining community are strongly opposed to some of its provisions.

UNITED STATES.

The commission appointed in Oklahoma to consider the question of the purchase by the State of 440,000 acres of coal and asphalt lands, has recommended their acquisition at a price not exceeding $10,000,000—to be raised by an issue of State bonds.

The Washoe smelter of the Amalgamated Copper Company at Anaconda, Montana, is again in operation, and it is anticipated that it will very shortly be turning out copper at its normal capacity of over 15,000,000 pounds per month. When fully in operation it will resume the purchase of custom ore, which will mean the resumption of work in several important companies in the Butte district.

In the Juneaw mining dsitrict, Alaska, there has been a steady advance in gold mining development. At the Treadwell group on Douglas Island the use of oil instead of coal has been introduced for the steam plant, materially reducing the cost of power.

HAITI.

Valuable gold placer districts have been discovered, one of the most important of which is situated in the southern portion of the island near Jacmel. Concessions have been secured from the Government by parties who are undertaking to develop the properties.

MEXICO.

Stockholders of the Douglas Copper Company have secured control of the Ryall and Mix concessions, Sonora, covering about 1,500,000 acres, which will be developed by the Mexican Exploration & Mining Company, capitalized at $5,000,000.

Three new smelters have recently been put into commission in Chihuahua, and are operating satisfactorily. Two of these plants are entirely new and the third has new machinery and improvements.

PERU.

Great preparations are being made by the Cerro de Pasco Copper Company, recently incorporated with a capitalization of $60,000,000, to develope the copper mining industry. The promoters of the enterprise are Mr. J. B. Haggin and other New York financiers, who have for some time been extensively engaged in this field. The export of refined copper from Peru twelve years ago was only 1,007,228 pounds, but since the Americans began work at Cerro de Pasco it was greatly increased, the shipments to the United States last year being 20,152,000 pounds.

STATISTICS AND RETURNS.

NOVA SCOTIA'S MINERAL OUTPUT.

Fiscal Year Ended Sept. 30th, 1907.

Nova Scotia's coal output in the fiscal year, 1907, was 125,945 tons less than in 1906, the amounts raised in each year being 5,866,605 and 5,730,660 tons respectively, according to the figures contained in the report of the Mines Department laid on the table of the House recently. Only in two counties, Inverness and Pictou, was more coal raised in 1907 than in the previous year. Inverness' figures were 345,391 tons, compared with 234,906, a gain of 110,941 tons. Pictou county produced 731,921 tons, 61,485 tons more than in 1906. In Cape Breton the output was 175,191 tons behind 1906, owing to the fire in the Hug colliery, while Cumberland county, owing to the strike in Springhill, went 130,526 tons behind the 1906 figures, only producing 508,202 tons.

Returns of Coal Sold.

The returns of coal sold during the year 1907 show, compared with the returns of 1906, as follows:—

	1906.	1907.
Nova Scotia	1,962,206	1,842,419
New Brunswick	434,882	427,128
Newfoundland	149,506	146,502
Prince Edward Island	76,809	77,493
Quebec	1,739,308	1,709,493
West Indies	.....	2,598
United States	769,775	616,312
Mexico	.....	7,591
Other countries	62,104	12,483
Bunker	.....	204,572
Total	5,194,590	5,046,690

The mineral output of the province for the year ended September 30th, 1907, was:—

Coal raised, gross tons	5,730,660
Pig iron, gross tons	293,436
Coke made, net tons	493,102
Iron ore, gross tons	562,746
Lime stone, net tons	458,601
Gypsum, gross tons	332,345
Gold, ounces	15,006
Bricks	25,000,000
Building stone, net tons	63,861
Cement, barrels	58,762
Antimony ore, net tons	1,403
Manganese ore, gross tons	495
Copper ore, net tons	2,471
Drain pipe, feet	300,000
Grindstones, net tons	350
Copper, pounds	12,320
Moulding sand, net tons	190
Barytes, net tons	.....

COBALT ORE STATEMENT.

For the Week Ending March 14th, 1908.

O'Brien Mine—March 7th, to Doloro Mining Company, Doloro, Ontario, 63,000; March 12th, 62,280 pounds. Total, 125,280 pounds.

La Rose Mines—March 7th, to La Rose Mines, Denver Col., 40,000 pounds; March 7th, 57,400 pounds; March 10th, 40,000 pounds; March 13th, 60,000 pounds. Total, 197,400 pounds.

McKinley-Darragh-Savage Mines—March 13th, to Pennsylvania Smelting Company, Carnegia, Pa., 62,460 pounds; March 13th, 64,200 pounds; March 13th, 63,000 pounds. Total, 189,660 pounds.

Cobalt Central Mining Company—March 7th, to Canadian Copper Company, Copper Cliff, Ont., 49,700 pounds.

Nipissing Mines Company—March 7th, to Nipissing Mines Company, New York, 63,000 pounds.

Watts Mine—March 11th, to American Smelting & Refining Company, Denver, Col., 52,730 pounds.

Buffalo Mines—March 11th, to Canadian Copper Company, Copper Cliff, Ont., 42,740 pounds.

Right of Way Mining Company—March 12th, to Doloro Mining & Reduction Company, Deloro, Ont., 60,210 pounds.

Provincial Mine—March 13th, to Deloro Mining & Reduction Company, Deloro, Ont., 50,000 pounds.

J. Rowland—March 14th, to Cowan, Toronto, Ont., 40,000 pounds.

Totals—870,720 pounds.

RAND OUTPUT SMALLER.

Official announcement is made that the production of gold at the Rand for January reached a total of 541,930 fine ounces, against 560,329 fine ounces in January, and 493,542 fine ounces in February a year ago. Last month's figures, based on the market value of $21.25 per ounce, represented $11,516,012, against $11,906,991 in January, and $10,497,767 in February, 1907.

The following tables gives the output by months (in fine ounces) for a series of years:—

	1908.	1907.	1906.	1905.
January	560,329	537,638	428,638	369,258
February	541,930	493,542	407,668	363,811
March		538,497	443,723	399,833
April		537,019	439,243	399,166
May		524,477	461,202	416,395
June		507,559	475,975	412,317
July		532,711	491,793	419,595
August		555,037	509,115	428,581
September		538,034	505,111	416,487
October		553,553	540,600	415,527
November		549,801	533,373	424,757
December		583,526	550,167	431,594
Total	1,102,259	6,551,662	5,786,617	4,897,221

BRITISH COLUMBIA ORE SHIPMENTS.

Week ending March 7th and year to date:—

	Week.	Year.
Boundary shipments—		
Granby	23,663	169,630
Crescent	28	28
Other mines		411
Total	23,691	170,069
Rossland shipments—		
Centre Star	3,042	32,420
Le Roie	1,634	15,300
Le Roie No. 2	854	6,351
Evening Star	79	334
Total	5,606	54,405
Slocan-Kootenay shipments—		
St. Eugene	593	5,070
Whitewater	90	156
Whitewater, milled	280	2,660
Queen, milled	185	1,655
Poorman, milled	250	1,600
North Star	76	656
Arlington, Erie	44	605
Vancouver	20	394
Ferguson	96	370
Richmond	51	365
Standard	21	337
Emerald	27	316
Ruth	41	241
Rambler-Cariboo	45	213
Nugget	22	191
Kootenay Belle, milled	25	125
Gallagher	25	25
Wellington	8	8
Grant	1	1
Other mines		8,967
Total	1,900	24,955

The total shipments for the past week were 31,197 and for the year to date 249,429 tons.

NOVA SCOTIA STEEL COMPANY'S COAL SHIPMENTS.

The coal shipments of Nova Scotia Steel & Coal Company for February and the two months are as follows:—

Shipments February, 1908	41,230
Shipments February, 1907	25,245
Increase February, 1908	15,985
Shipments 2 months, 1907	55,974
Shipments 2 months, 1908	88,980
Increase 2 months, 1908	33,006

During the month of February the Nipissing Mines produced approximately $102,000 worth of ore and shipped ore to the smelters that month of a value of $54,000.

The output of the Crow's Nest Pass Coal Company's collieries for this week was 21,140 tons; daily average 3,523 tons. The week in the past four years compares as follows:—1908, total, 21,140 tons, daily average 3,523 tons; 1907, total 20,105 tons, daily average 3,351 tons; 1906, total 18,523 tons, daily average 3,087 tons; 1905, total 11,997 tons, daily average 1,999 tons.

OUTPUT OF COAL AND OTHER MINERALS IN THE UNITED KINGDOM IN 1907.

COAL.

The Home Office Mining Department has issued its annual preliminary return, showing the quantities of coal and other minerals raised in the United Kingdom in 1907, together with statistics as to the persons employed. The output of coal from mines under the Coal Mines Regulation Act, which was 251,050,809 tons in 1906, was 267,828,276 in 1907, showing an increase of 16,777,467 tons. The increase in the twelve inspection districts respectively were as follows:—

	Tons.
East Scotland	1,660,482
West Scotland	439,697
Newcastle	764,906
Durham	1,154,128
York and Lincoln	2,624,036
Manchester and Ireland	502,803
Liverpool and North Wales	1,151,229
Midland	3,947,465
Stafford	1,301,148
Cardiff	862,744
Swansea	1,101,687
Southern	1,267,142
Total increase	16,777,467

The number of persons employed at mines under the Coal Mines Regulation Act was 940,618, an increase of 58,273. The increase in the output of coal is at the rate of 6.68 per cent., and the increase in the number of persons employed at mines under the Coal Mines Regulation Act is at the rate of 6.60 per cent. The output of coal by counties was as follows:—

England.

	Tons.
Cheshire	381,654
Cumberland	2,253,790
Derby	18,083,016
Devon	.....
Durham	40,264,871
Gloucester and Kent	1,683,083
Lancaster	26,183,274
Leicester	2,816,885
Lincoln	.....
Monmouth	13,195,688
Northampton	.....
Northumberland	13,722,029
Nottingham	11,728,886
Shropshire	862,173
Somerset	1,158,529
Stafford	14,605,706
Warwick	4,553,766
Westmoreland	1,146
Worcester	715,789
Yorkshire	35,173,561
Total	187,383,846

Wales.

Brecon	622,728
Carmarthen	1,972,353
Denbigh	2,742,788
Flint	726,882
Glamorgan	34,137,733
Pembroke	49,694
Total	40,252,178

Scotland.	
Argyle and Dumfries	245,624
Ayr	4,073,320
Clackbannan	419,959
Dumbarton	493,508
Edinburgh	2,344,792
Fife	8,530,043
Haddington	1,069,733
Kinross	132,130
Lanark	17,968,298
Linlithgow	1,805,335
Peebles	875
Renfrew	38,072
Stirling	2,965,088
Sutherland	5,771
Total	40,092,548
Ireland.	
Antrim	4,813
Kilkenny	65,366
Leitrim	1,400
Queen's County	2,686
Roscommon	13,945
Sligo	1,064
Tipperary	9,341
Tyrone	1,089
Total	99,704
Gross total	267,828,276
Total in preceding year	251,050,809

Ironstone.

To the total output of 8,236,118 tons of ironstone, shown in the above table, the principal contributing districts were as follows:—Cleveland, 6,230,987 tons; Staffordshire, 1,036,239 tons; and Scotland, 700,148 tons. These figures do not include the quantities work on the West Coast, in Lincolnshire, Warwickshire, and one or two other districts, neither do they include the output from quarries.

Mineral Production Under Metalliferous Mines Regulation Acts.

The following table shows the output of various minerals under the Metalliferous Mines Regulation Acts, during 1907, as compared with 1906:—

Description of Mineral.	Total in 1907. Tons.	Total in 1906. Tons.
Arsenic	1,473	1,699
Arsenical pyrites	697	640
Barytes	30,343	27,827
Bauxite	7,537	6,654
Chalk	1,765	2,902
Chert and flint	5,372	4,912
Clay and shale	114,525	118,521
Copper ore and copper precipitate	6,759	7,758
Fluorspar	40,229	36,280
Gold ore	12,987	17,384
Gypsum	195,266	196,143
Igneous rocks	69,871	72,722
Iron ore	1,803,063	1,824,415
Iron pyrites	2,800	3,798
Lead ore	31,215	30,226
Limestone	470,263	765,718
Manganese ore	16,098	22,762
Ochre, umber, etc	4,789	4,415
Oil shale	210	409
Rock salt	243,345	230,558
Sand	23,580	12,642
Sandstone	b156,324	168,077
Silver ore	4	1
Slate	116,570	126,699
Tin ore (dressed)	6,087	6,276
Uranium ore	71	11
Wolfram	312	263
Zinc ore	19,945	22,824
Total	c3,381,491	3,712,436
Number of persons employed:—		
Underground	18,559	17,818
Above ground	13,008	12,413
Total	31,567	30,231

a Including 8,363 tons of calc spar.
b Including 11,864 tons of ganister.
c In addition to this quantity 80 tons of mixed ores (containing arsenic, copper, tin and wolfram) were obtained.

Minerals.

The output of various minerals under the Coal Mines Regulation Acts, and the number of persons employed in their production, are shown in the following table:—

Description of Mineral.	Total in 1907. Tons.	Total in 1906. Tons.
Barytes	10,297	7,199
Clay and shale, other than fireclay and oil shale	320,889	252,275
Coal	267,828,276	251,050,809
Fireclay	2,890,197	2,971,173
Igneous rocks	146	424
Iron pyrites	7,394	7,342
Ironstone	8,236,118	8,209,880
Limestone	22,366	32,816
Oil shale	2,675,779	2,546,113
Petroleum	.....	10
Sandstone (including Ganister)	*128,103	126,675
Total	282,119,565	265,204,716
Number of persons employed:—		
Underground	757,887	709,545
Above ground	182,731	172,800
	940,618	882,345

*The quantity of ganister obtained was 120,103 tons.

Company Reports.

Nipissing declared its regular quarterly dividend of 3 per cent., or 15 cents a share, payable on April 20th. Books close March 27th and re-open April 23rd. The financial statement of the company as of March 14t his approximately as follows: Cash and silver bullion on hand, $457,000; accounts receivable, $134,000; ore in transit and at smelter, $175,000; total $896,000, less dividend of 3 per cent., payable April 20th, $180,000; balance, $716,000. It is stated that financial condition of the company and conditions at the mines continue to show improvement. It is expected that by April 20th the company will have earned nearly the $180,000 required to pay the dividend declared.



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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $1 an acre according to the distance from railroad.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St., Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries
Parliament Buildings, Quebec.

The Canadian Miner's Buying Directory.

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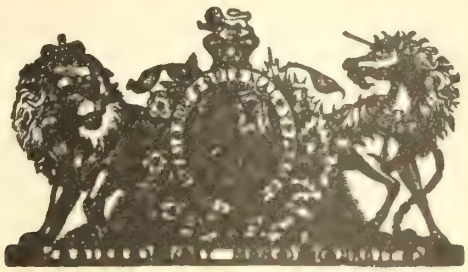
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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

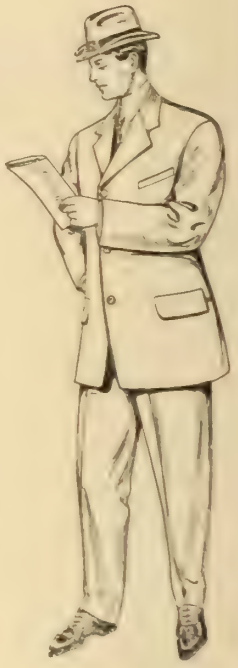
Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

Men's Tweed Suits

Regular $10.50 Value for $7.95

M.J.104. After carefully going through the different makers' samples, to which our large buying powers give us access, we selected this material on account of its worthiness in wearing qualities and its neat yet handsome pattern, which lends itself particularly well to this style of suit. By contracting for the entire output of this line, we have secured a price concession which enables us to offer our customers this big saving on an honest suit.



The material is an imported English tweed of durable quality, in a dark ground with lighter intermixture, giving a pepper and salt effect; into this is woven red and blue stripes and cross stripes, forming a subdued broken check pattern, being neat and quiet—a material which any gentleman would select for business or general wear, made in a single-breasted sack style, lined with a fancy twilled mohair lining, stayed with linen, shoulders and front reinforced with shrunk linen duck and hair cloth, guaranteed to retain their shape, well tailored and perfect fitting, sizes 35 to 44. Regular $10.50 value,

Our Special Price 7.95

A Sensational Tent Offer

$16.00 Value for $11.95



M.J.105. Experienced summer campers prefer this style of tent because it is so easily erected, and is practically storm-proof. By placing large orders with one of the largest manufacturers on the continent we are able to offer the BIGGEST TENT BARGAIN you have ever heard of. This tent is made of full weight 8-oz. duck. The seams are double stitched and strain points reinforced. Height, 8 ft.; length, 12 ft; width, 9 ft. 6 in.; height of wall, 3 ft. Complete with poles, pegs and ropes. You will find that the lowest price for this tent elsewhere is $16. Our special price **$11.95**

Money Refunded if for Any Reason you are Not Satisfied

Write for our Spring and Summer Catalogue. Free to any address.

THE ROBERT SIMPSON COMPANY, LIMITED
TORONTO, CANADA

Write to-day for Our Spring and Summer Catalogue.

THE "LITTLE HARDY" COAL CUTTER

Holes at Floor Level or Roof Level or in any intermediate position in Coal or Dirt Band, &c.

Nearly **700** Machines at Work



Equally suitable for Holing or Shearing

The Lightest Coal Cutter in the Market

93 in use by one Canadian Company

The "Hardy Nipper" Hammer Drill

Weight 22 lbs. Bores 6 ft. Deep

Automatically Rotates the Drill Steel and Blows Out the Cuttings

FOR SINKING, &c.

SOLE MAKERS

THE

HARDY PATENT PICK CO. Ltd.

SHEFFIELD, ENGLAND

Stocks of these machines kept by Messrs. A. C. THOMPSON CO., Limited,

North Sydney, Nova Scotia, Canada.

Farrel Rock and Ore Crushers

STYLE "B"

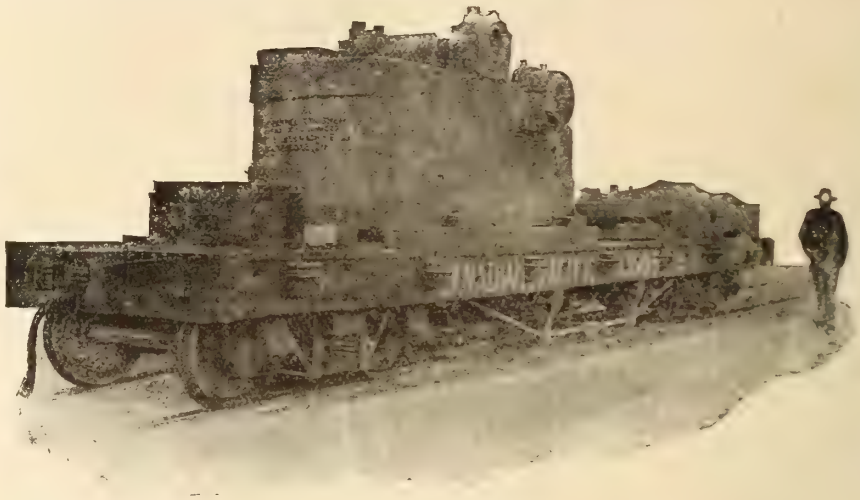
In all sizes—from 7 x 10, capacity 5 tons an hour up to 48 x 36, capacity 200 tons an hour.

Cut shows principal parts of our 42 x 30 crusher occupying full car of 100,000 lbs. capacity.

This machine complete weighs about 125,000 lbs.

It is the largest size Jaw Crusher so far built in Canada.

One Mining Company in B.C. already has four of them in use.



Write for our Crusher Catalogue No. 602

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The **Jenckes Machine Co.** Limited

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Please address enquiries to nearest Sales Office.

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Rutherglen, Glasgow, Scotland

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For Collieries, Mines, Aerial Tramways

Transmission of Power, Logging and general Hauling and Hoisting Purposes.
Wire specially selected for own exclusive use.
We have made many records with our Winding, Haulage and Crane Ropes.

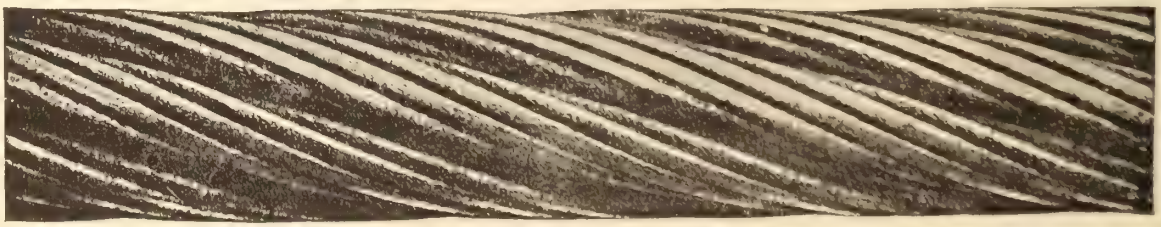


Illustration of **Winding Rope,** 240 fms. long x 3½ circ. Galvanized Special Improved Patent Steel, Compound Make, supplied to Kinneil Collieries, Bo'ness, Scot., which gave a record life of 6 years and 2 months. Showing condition when taken off.

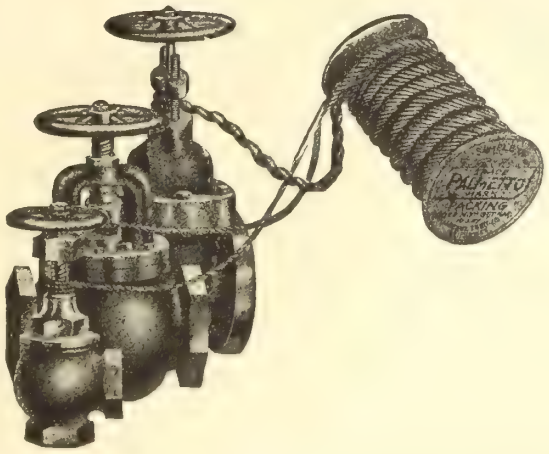
TELEGRAMS—" Ropery, Rutherglen." **Codes** { **A. B. C. (4th and 5th Editions).** **A.1., Lieber's and Private.**

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PALMETTO TWIST PACKING

For Large and Small Valves



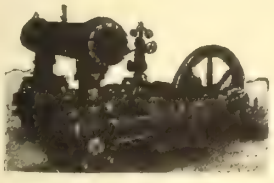
You don't have to know the size Packing required by the large and small Valves about the plant.

Just take a spool of PALMETTO TWIST with you and by unstranding you can pack any size valve and at the same time know that it will stay packed because PALMETTO is made of a substance that heat cannot affect, and its own perfect lubrication keeps it soft and pliable in service.

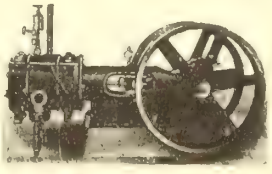
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MONTREAL TORONTO ST. JOHN WINNIPEG CALGARY VANCOUVER







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EFFICIENT AND ECONOMICAL

Complicated mechanism in air compressor design is regarded as an element of weakness and it is the elimination of such non-essentials that has produced the up-to-date RAND Machine; a machine which operates with the minimum of attention and repairs.

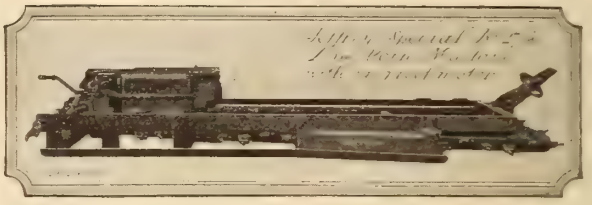
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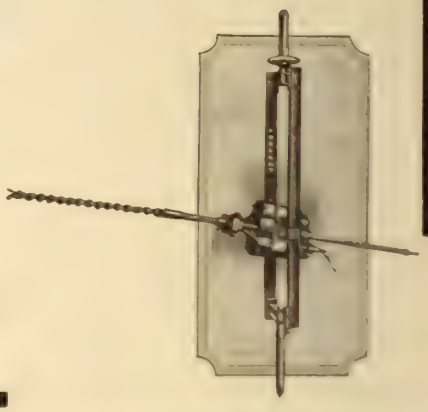
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ELECTRIC COAL CUTTERS AND DRILLS
WITH
ENCLOSED MOTORS

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THE JEFFREY A5 DRILL

Is suitable for working coal, clay, slate, gypsum or any material into which an augur bit can be driven.

We make the only commercially successful
ELECTRIC ROTARY DRILLS



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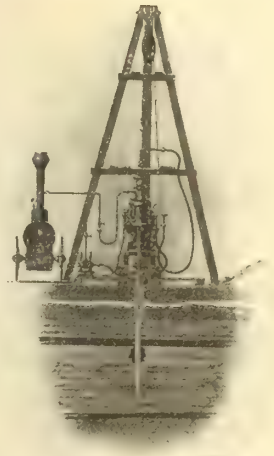
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10 NOW IN USE IN COBALT
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Sullivan Diamond Drills



View of Sullivan Drill Outfit and section of ground showing drill rods.

are more widely used for testing mines and mineral lands than any other prospecting drills made, because they remove a solid core from all rock formations penetrated, from soft coal or rock salt to the hardest ores. Will bore holes at any angle and to any depth, and will remove cores of any desired diameter.

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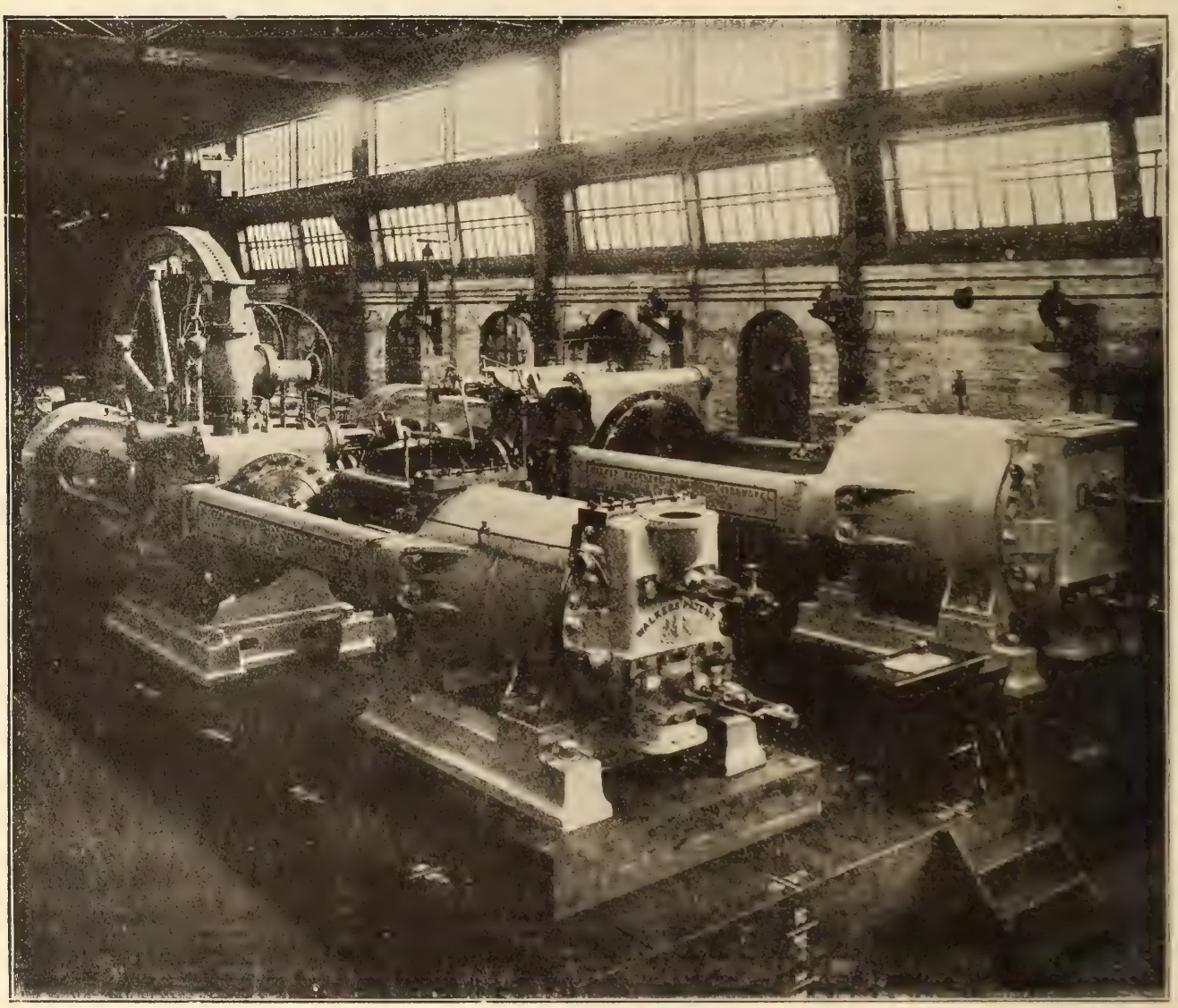
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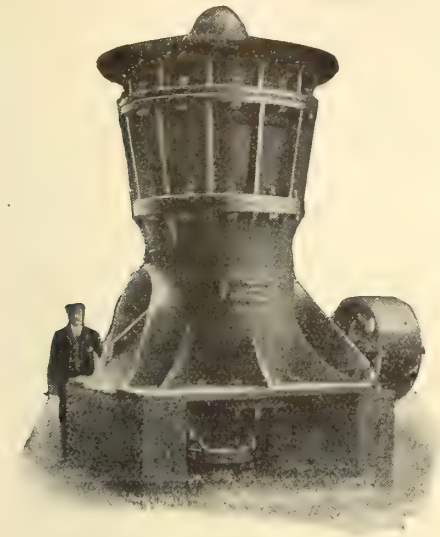
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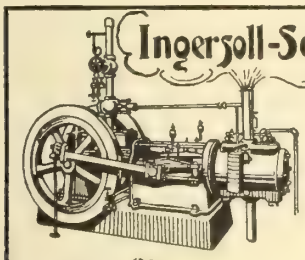
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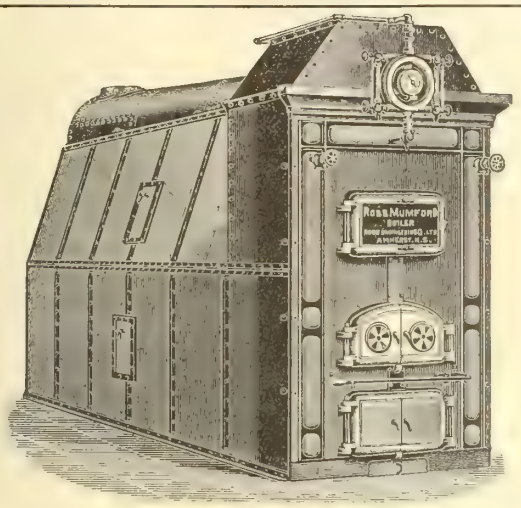
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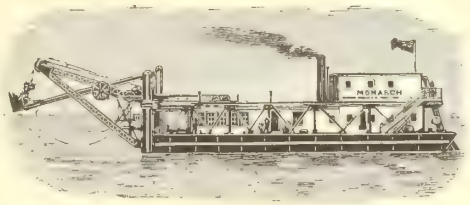
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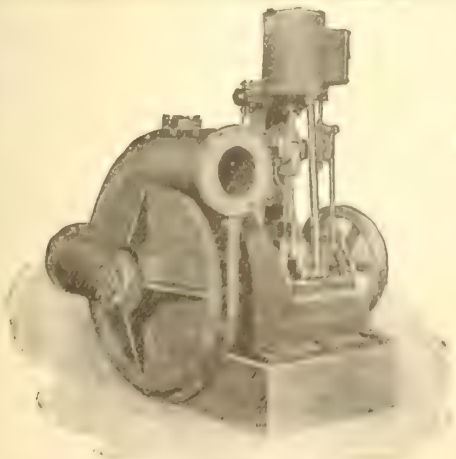
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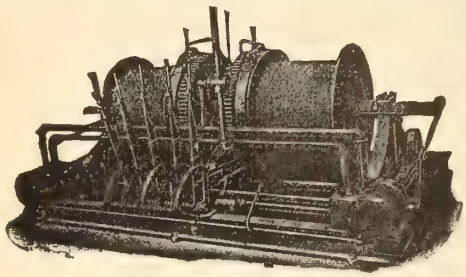
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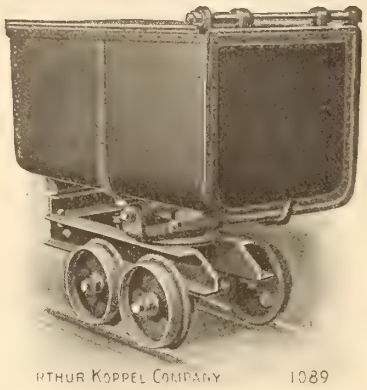
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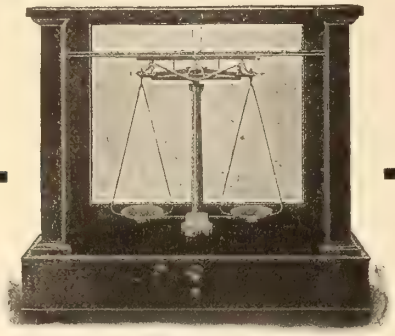
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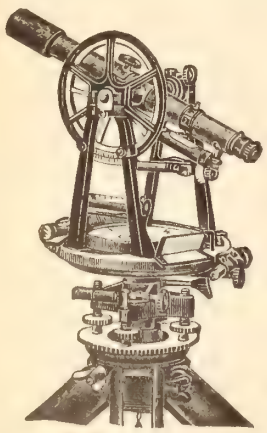
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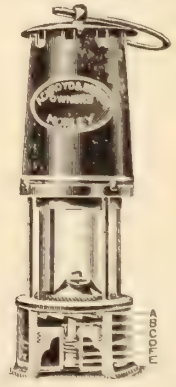
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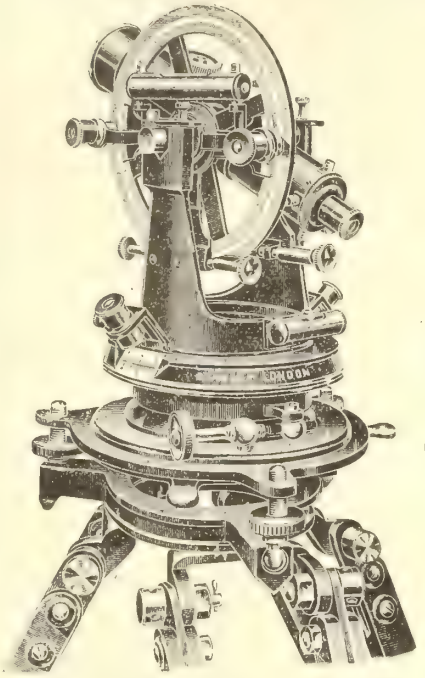
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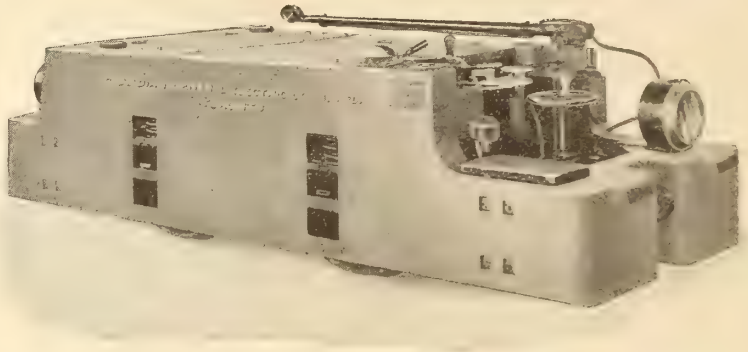
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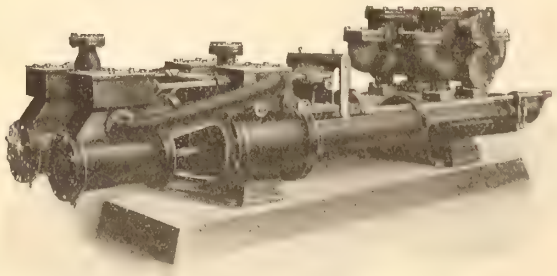
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THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

VOL. XXIX. TORONTO and MONTREAL, April 15, 1908 No. 8

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of THE CANADIAN MINING JOURNAL were printed and distributed, or an average of 3,822 per issue.

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MINING SOCIETY OF NOVA SCOTIA.

On another page full notice is given the annual meeting of this live and energetic body. The vigor and hospitality of the Mining Society have become proverbial. Its announced ambition is to develop and advertise the mineral resources of Nova Scotia. With this in view representatives of the Canadian and United States Geological Surveys and of sister societies were invited to attend the recent annual meeting. These distinguished visitors were asked for advice and they gave it.

The freedom of the Ontario Bureau of Mines from political influence was pointed out by one speaker. Another described the work of the United States Geological Survey, especially in its relation to State surveys. Substantial assistance was promised from the Mines Branch of the Federal Department of Mines. On behalf of the Geological Survey, a continuance of the invaluable work done by Messrs. Fletcher and Faribault was assured.

This should be eminently encouraging to Nova Scotia mining men.

Two points, however, accentuated by two of the speakers, should always be borne in mind.

The first of these is that no government can afford to undertake work that should be performed by private individuals.

Secondly, co-operation amongst the operators themselves is essential to progress.

These, doubtless, are truisms. But they are important truisms.

Governmental paternalism weakens any industry. On the other hand, judicious assistance from the government, given at the right time and in the proper way, may galvanize a moribund industry into healthy and permanent activity.

It remains for the Mining Society of Nova Scotia to determine just what assistance the mineral industries of the Province require. And this is a question the seriousness and complexity of which must not be overlooked.

Bounties are temporary expedients. Tariffs have a larger field of application, and, in some instances, must be considered. But, more vital than these, is the necessity of *knowledge* of the extent and value of already discovered mineral deposits. This can be secured only by intelligent private enterprise, assisted by the Federal and Provincial Bureaus. Topographic and geologic surveying and diamond drilling are legitimate forms of government assistance. To these may be added the publicity given by means of official publications.

If, however, these official efforts are not utilized fully and promptly by the mining fraternity, they become worse than useless.

We would therefore urge the Mining Society of Nova Scotia to follow keenly the campaign laid out during its recent annual meeting. Nothing will be accomplished if matters are allowed to drift until next year. Even at the cost of much expense and inconvenience, monthly or, if necessary, fortnightly meetings should be held. There are not a few ardent workers in the Society, who do not receive the encouragement and praise due them. Their enthusiasm should be utilized.

Organized effort alone will bring Nova Scotia into the position that she deserves.

THE GRANBY CONSOLIDATED.

Stevens' "Copper Handbook" is an annual volume whose appearance is welcomed by copper workers the world over. As the work of one man, it is a monument of industry and intelligent discrimination. It is reliable and comprehensive. Of dubious enterprises it expresses its opinion unhesitatingly. Hence it is of extraordinary value to the investor.

It is pleasant to read Mr. Sevens' warm praise of a Canadian copper concern. In concluding a detailed description of the Granby Consolidated Mining & Smelting Company's mines and works at Phoenix and Grand Forks, B. C., Mr. Stevens speaks thus of the company's execution:—

"Both mine and mill have been brought to a high state of efficiency, and the cost sheet is one of which any directorate well might be proud. . .The Granby is one of the few copper properties of the world of which a careful investigation leads to the verdict that there is nearly everything to commend, and scarcely anything to criticise."

Mr. Stevens' praise is worth something.

TRANSVAAL STOPE DRILL COMPETITION.

We have received from the London secretary of the Transvaal Chamber of Mines the following communication to which we are glad to give a prominent position:—

Transvaal Stope Drill Competition.

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"The competition will commence early in 1909, and entries will probably close with the end of 1908. The trials will last about six months, the drills being tested in the first instance on the surface, and those considered suitable being given a more prolonged test underground in several stopes in various mines on the Witwatersrand.

"The detailed conditions governing the competition, including the exact date of closing entries, will be published as soon as possible.

"All enquiries should be addressed either to:—The Secretary, Stope Drill Competition, Transvaal Chamber of Mines, Johannesburg, Transvaal; or to:—The London Secretary, Transvaal Chamber of Mines, 202, 203 and 206 Salisbury House, Finsbury Circus, London, E. C."

CLEAN ADVERTISING.

We have had occasion in the past to allude to dishonest and ilegal advertisments published in supposedly reputable newspapers. It has always been our contention that newspapers and, indeed, all periodicals are morally responsible for the fitness and decency of the advertisements that they carry.

It is therefore gratifying to mark the vigorous position taken by Mr. Medill McCormack, a Chicago journalist. Addressing the Canadian Press Association, Mr. McCormack spoke in part thus:—

> "The newspaper is only as clean as its advertising columns . . .We endeavor through our editorial columns to secure the confidence of our readers, and, having gained that confidence, we must not stand sponsor for any man who is not fit to come within the family circle. We must no more thinking of giving letters of introduction to the thief, or the liar, or a monger of filth than we would of giving a black-leg or a libertine a card to our clubs or inviting him to dine with our home folks."

THE CLIMATE OF KLONDIKE.

Distance lends enchantment to the view. Given some thousands of intervening miles, a writer may safely constitute himself an authority upon topics of which his knowledge is by no means complete.

In The Canadian Mining Journal of January 15, 1908, we drew attention to the general inaccuracy of the articles in dredging in the Yukon, written by Mr. J. P. Hutchins in the Engineering and Mining Journal of New York. Our criticism was offered with the utmost good will. Unfortunately Mr. Hutchins has chosen to take offense. In the Engineering and Mining Journal of March 1, he devotes five columns to us. Most of what he writes is—to say the least—not appreciative

In fact it may be fairly described as vituperative. Consequently it does not require further attention. But we regret that no attempt has been made to answer any of our criticisms.

That Mr. Hutchins' articles are misleadingly depreciatory may be inferred from his statement about the climate of the Klondike. To prevent misconception we shall quote this passage verbatim:—

'In the Klondike, May 1st. is about the earliest in normal years that dredging can begin; but owing to the superficially frozen ground, which is found even in the milder areas, such as the Klondike valley, it is rarely advantageous to begin so early. Besides even at that season the day and night temperatures approximate 50 degrees F. and —15 degrees respectively. Dredging can be continued until October 15th, when the day and night temperatures are about 30 degrees F. and —15 degrees F. respectively.'' We interpreted this in our criticism as follows:— ''The extraordinary statement is made that the average night temperature on the first of May and on the fifteenth of October is fifteen degrees below zero F.,'' which seems to us the only rational interpretation possible.

Mr. Hutchins in his reply, however, says, '' I said nothing about average temperatures. I cited figures to show the extreme night and day temperatures.'' We shall, for arguments' sake, allow Mr. Hutchins' version to stand, although these two statements are manifestly contradictory. But even his last statement is far enough from the truth to need serious correction. Fifteen degrees below zero has never been officially recorded in the Klondike either in May or October. The Canadian Meteorological Service has been taking temperature observations in the Klondike for a number of years. The lowest temperature that has ever been recorded officially in the Klondike in May is 5 degrees above zero F. and the lowest October record up to the 31st of the month (not the 15th) is 10 degrees below zero F. The weather therefore, at such times of the year, is not nearly so cold as Mr. Hutchins would like us to believe. In fact his damaging statement about the climate is but in keeping with the general tone of the whole article.

On several occasions it has been our duty to expose or correct inflated accounts of mining properties in different parts of Canada. It is equally our duty not to allow a grossly derogatory description of one of the greatest mining camps in Canada to go unnoticed and uncorrected.

"THE FALLS OF NIAGARA."

Some weeks ago we referred with pain to the possible publication of Dr. Spencer's ''Falls of Niagara.'' We spoke warmly, not that we wished to interfere with the worthy author's desire to see himself in print, but because we thought that the volume should not appear under the aegis of the Geological Survey of Canada.

However, the book appeared. We preserved a silence equalled only by our desire to express our feelings. That silence we shall observe. Yet we are forced to notice briefly a scathing review of Dr. Spencer's tome that appeared in a late issue of our exceedingly outspoken contemporary, *The Mining and Scientific Press*, of San Francisco.

The *Press* vivisects ''The Falls of Niagara'' in a style that is all its own. It rubs salt into the incisions. ''This,'' it remarks, ''is the delirious trimmings of scientific literature.''

To all this we shall say neither ''yea'' nor ''nay.'' But we shall point out one error into which our contemporary has fallen.

The credit (or otherwise) of the appearance of the volume under consideration lies neither with the Acting Director of the Survey nor yet with the brilliant and energetic editor. The latter, indeed, stands absolved from all complicity.

The facts appear to be that Dr. Spencer insisted upon holding the Survey to an ancient contract, made under a former regime. And in his preface the author, albeit somewhat obliquely, states that he himself, and only he, is the person responsible.

We hope, then, the the *Mining and Scientific Press* will relieve itself of the misconception that ''The Falls of Niagara'' is the acknowledged child of the Geological Survey. The Survey's child it is, but it was found upon the doorstep.

THE NEED OF PROSPECTING.

Mr. Leach, in his paper read before the Canadian Mining Institute, refers to the small amount of systematic exploration that has been done upon the Moose Mountain Range. If this is true of Moose Mountain Range, it is even more true of the other Ontario, Quebec and Nova Scotia iron ore districts. Mr. A. B. Willmott, in his excellent monograph on ''The Iron Ores of Ontario,'' makes a striking and effective comparison. He refers thus to the work done in one small section on the United States side of the Lake Superior country and contrasts it with what has been attempted in Northern Ontario: ''The amount spent on exploration on the Vermilion range alone, between Tower and Section 30, a distance of say thirty miles, probably surpasses all the money spent in actual exploration of the hundreds of miles of similar ranges in Northern Ontario.'' This fact is eloquent.

One of the conditions that hamper the development of Canadian iron deposits is the fact that owners usually stipulate for excessive royalties or grossly over-estimate the value and extent of their holdings. Another cause is the apparent unwillingness of Canadian consumers to grant reasonable terms to possible shippers. In other words, with one or two exceptions, there appears to be a decided diffidence on the part of Canadians in embark-

ing on the development of our iron ore deposits. The situation is a complicated one. But of this we are sure, namely, that Federal and Provincial bounties should be so adjusted as to encourage directly the use of Canadian ores.

MINERS' RELIEF SOCIETIES.

In the Province of Nova Scotia there are 12,000 colliery workers. At present there are sixteen miners' relief societies. The report of the Commission appointed some months ago to enquire into old age pensions and miners' relief societies, sets forth some of the weaknesses of existing relief societies. The entire lack of co-operation is, perhaps, the most serious drawback to the present system. The heavy cost of administration is also a hardship upon the miners.

The Commissioner's report therefore recommends that the Government of Nova Scotia take over the management of the funds of the several societies in excess of $1,000, and that the societies themselves be organized into one large body with local branches.

We cordially agree with the idea of consolidation. The risk of insolvency will thus be reduced and the rates should become cheaper. But we see no justice in the claim that the Government should handle and administer the funds. It will be far better for all concerned, it will make for peace and mutual respect, if the miners' organizations control their own affairs. The suggested arrangement smacks of class legislation.

A CORRECTION.

Our Glace Bay correspondent has drawn our attention to an item that appeared in our last issue under Mining News of the World. The statement is there made that after the late Hamstead colliery disaster the rescue apparatus proved ineffective. This was by no means the case. Such a statement, indeed, is calculated to destroy the growing and much-needed confidence of operators and workmen in the apparatus used. In our next issue the matter will be given more attention.

THE MONTREAL RIVER DISTRICT.

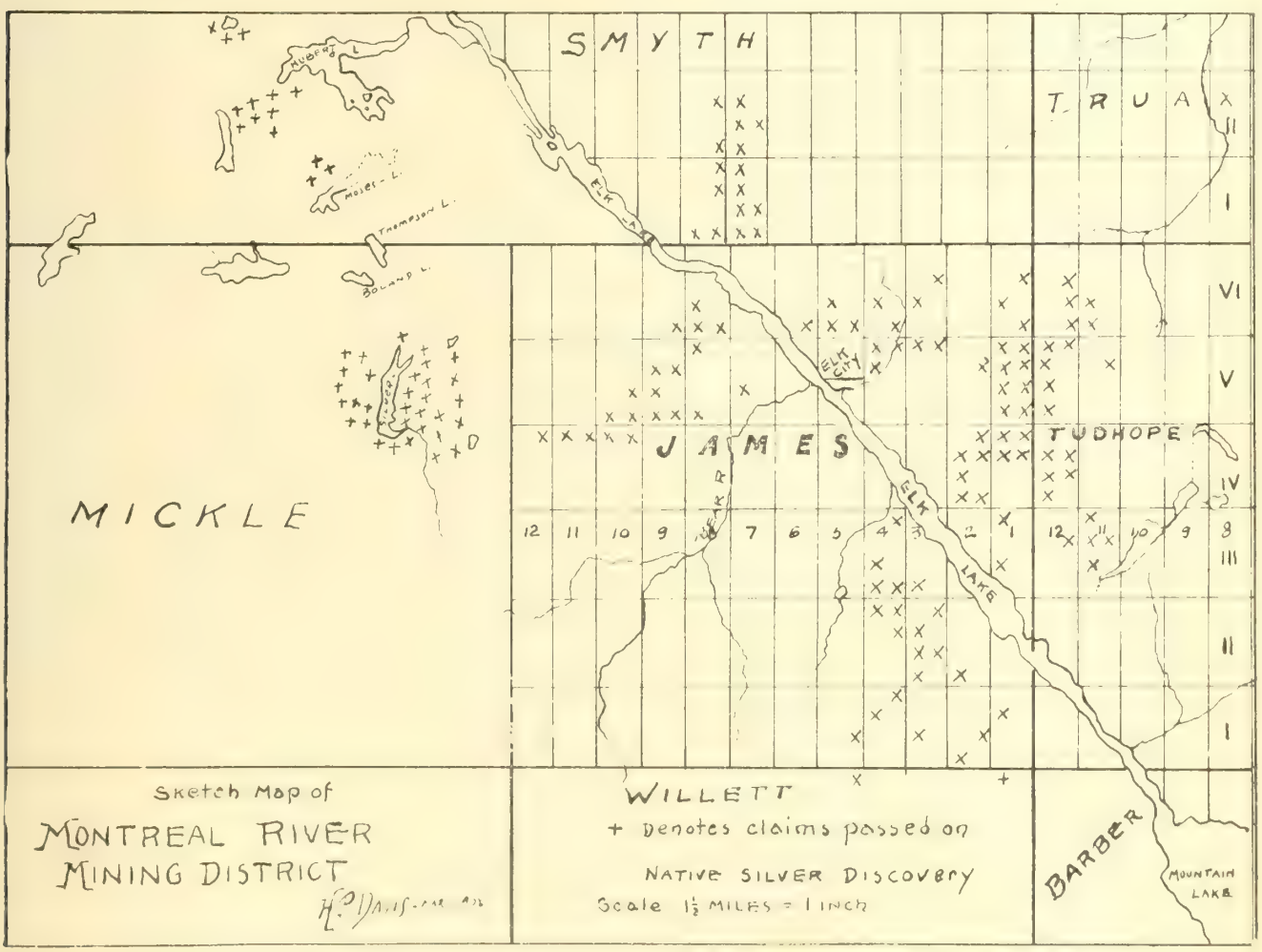
By Harold P. Davis.

With one conspicious exception, there are no promotions in the Montreal river field, and few capitalized companies. The small amout of development work has been done by individuals. It is clearly understood by the owners and prospectors in the district that, with the present attitude of the investing public towards Northern Ontario mining fields, the development of this section depends upon their own efforts, and that there is little hope at present of obtaining assistance from outside sources. It is yet impossible to draw definite conclusions as to the persistence of the veins, or the depth of the silver enrichment.

With adequate funds devoted solely to development work, and the evidence of values which seemingly justify this development, the coming spring and summer should demonstrate whether the diabase areas in the vicinity of Silver Lake, Hubert Lake, and in James, Smyth, Tudhope, and Willet Townships, have or have not silver values in shipping and milling quantities. Strangely enough, although nothing is mineralogically exceptional in a region radiating from Cobalt, the values are seemingly confined to the diabase, and so far no evidences of silver and very few veins of any sort have been noted in the conglomerate upon which Cobalt primarily pinned its faith. If the development of the rich outcropping veins confirms the surface showings, and the sinking of shafts or diamond drilling demonstrates the values existing at depth, ample funds will be forthcoming, and there is no doubt in the minds of those familiar with this section that it will take but little of such work to prove up shipping mines. While the areas of enrichment have not been definitely determined, the district under immediate exploration extends from Mountain Lake to Hubert Lake; Elk Lake which is an expansion of the Montreal river intersecting them for a distance of fifteen miles.

Approximately twenty miles to the west, in the vicinity of Bloom Lake, there has been more or less activity with very favorable results. However, it is the six townships surrounding Elk Lake which will either register another silver camp in the Nipissing district, or a mineralogical freak. The areas of diabase and gabbro disclosing silver, smaltite, and associated minerals, include that portion of James township from its north west corner along the south bank of the river to the southeast corner. The area along the boundary of James and Tudhope includes lots 1 to 4 in the former; and lots 12, 11 and 10 in the latter, the section north of the river in lots 4, 5, and 6 in James; lots 7 and 8, concessions I and II Smyth; and the territory extending from Hubert Lake south through Thompson and Boland Lakes to Silver Lake. It has been remarked that the richest sections are generally in the narrower bands or belts of diabase which are outlined by quartzite and granite, the prevailing rocks of this district. The vein matter is calcite, barite, or aplite. The silver which probably was carried up with the vein filling occurs as leaf and fine grains. These veins are from a few inches to two feet in width and carry in places from a few ounces to several thousand ounces of silver. The calcite veins vary in width from narrow seams to 18 or 20 inches, and are in many instances decomposed on the surface, the silver being found in fine grain and leaf disseminated through a black muck. A pit sunk on one of these veins a few feet in depth usually reaches the rock calcite which carries as a rule a varying percentage of chalcopyrite, and in many cases smaltite and niccolite. There are also a number of outcropping veins of

specular iron often carrying small amouts of silver and in some instances showing native silver. In the narrow diabase tongue in lots 7 and 8 in Smyth rich veins have been located. Out of the sixteen claims in lot 7 concessions I and II all are passed, and nine have native silver finds. In lot 3, concession VI, James, on one of the seven claims of the Montreal River International Mines passed on native silver discovery, a vein of calcite uncovered for over four hundred feet exists in the contact between the conglomerate and diabase which is 14 inches wide, and carries smaltite, niccolite, and a little silver. In lot 7, concession I, Smyth, on another claim belonging to this company a vein 18 inches in width with a barite gangue has a streak of calcite 3 inches wide containing smaltite and native silver along the hanging



wall. Native silver also occurs in the barite but is more generally distributed in the calcite. A shaft has been sunk on this vein to the depth of fifty feet, and drifting at this level showed the vein equally strong as at the surface. The barite at this depth is largely replaced by calcite.

On the property of the Moose Horn mines north of Elk City in James township a number of rich narrow veins carrying high silver values are being developed. In the northeast corner of James township, on the Meyer and Ellis claims, are some promising veins of aplite. Native silver has been found in four leads in this group one of which is eighteen inches to two feet wide and has been uncovered for four hundred feet. The Munroe and Mitchell, the Harbeck, and the Bradshaw and McVittie claims in this section all have native silver in calcite or aplite veins, which also generally carry a large percentage of chalcopyrite. On the Gates claim in lot 8, concession VI, James, nuggets of silver weighing over fifty pounds have been taken out, while the values are reported to have pinched out in this vein at the depth of fifteen feet, the loss of values in a narrow vein of calcite in the one test pit sunk is not by any means to be taken as a fair test. From the surface indications it would seem that this property has a good chance of proving valuable. South of Gates in lot 8, concession V, on one of the Downey claims is a four inch vein of calcite and silver which compares favorably with the veins in Cobalt. Active work will begin on this claim in the spring. Sixteen claims in this vicinity have native silver showings. On a large percentage of the claims in the diabase area in the vicinity of Silver Lake, native silver has been found. Four out of five of the claims belonging to the Clinton and Steindler Syndicate have one or more veins showing native silver, and the fifth a galena vein eighteen inches to two feet wide which runs 37 1-2 per cent. lead with a little silver.

A vein which showed cobalt bloom and decomposed calcite on the surface, turned to rock calcite, smaltite and silver in a few feet. Specimens from this vein are difficult to distinguish from the typical high grade ore from Coleman township. Otisse Brothers have three high grade silver veins on a lot west of the lake adjoining Clinton and Steindler, one of 4 inches in width which carries high values. These discoveries were all made

by the Otisse Brothers with prospecting picks, and practically no trenching has been done. The richest vein in this section yet discovered is on the Shane-Downey lot southeast of Silver Lake, the title of which is now in dispute. The vein matter is aplite and was recently described in a report written by an eminent authority on Canadian mining fields as being six to eight inches wide, and carrying twenty-five per cent. silver. A total



Camp on Bear Point.

of twenty-nine out of thirty-seven passed claims in the vicinity of Silver Lake have native silver discoveries. The cross marks on the sketch map which accompanies this article indicate claims upon which have been made one or more discoveries of native silver. A line drawn round and including these claims would approximately outline the diabase areas of the Montreal river district, and at the same time include all the important discoveries so far mode. This area would be greater than the proven field in the Cobalt camp.

Owing to a most unfavorable combination of circumstances very little systematic prospecting has been attempted. The first discovery in this district made in the fall of 1906 was not followed up in time to see much work accomplished before the winter set in. The late



A Prospector's Tent.

spring and exceedingly wet summer of 1907 made prospecting difficult. However, some important discoveries were made this winter in spite of the snow. The arrangements which have been entered into for the inauguration of extensive work on a number of the most important properties as soon as the snow leaves the ground, and the rapidly increasing number of outfits entering the field with supplies and equipment indicate that the proving of this district will shortly begin in earnest. Whilst the fact that conditions do not favor a repetition of the Cobalt "boom" may possibly delay the early development of the Montreal river district, there can be no question that this will make for the ultimate good of the new camp. Specimens of ore such as are reproduced on the title page of this issue of The Canadian Mining Journal, while not to be taken as average samples of the discoveries, are sufficiently characteristic of this district as to be distinctly encouraging. An engineer who is recognized as one of the foremost authorities on the mineral deposits of Ontario stated recently in a report to his company: "It seems more than probable that in the coming summer when the conditions for discoveries and prospecting will be more



Winter scene at Silver Lake.

favorable that many wider and richer veins will be found. The region is one of great and wonderful promise."

At present the only means of reaching this district is by the winter road from Earlton on the T. and N. O. R. (Government Railway) through the townships of Armstrong, Beauchamp, Bryce and Tudhope, to Elk City in James, a distance of thirty two miles. As soon as the ice is out traffic will be by boat up the Montreal river from Latchford, a station south of Cobalt on the T. and N. O. R. R., about fifty two miles southeast of Elk City. Two lines of small steamers will be operated. It is practically assured that the Charlton branch of the T. and N. O. will be extended to Elk City, a distance of seventeen or eighteen miles, as soon as sufficient ev-

dences of the importance of the mineral deposits are given. Already two rival towns have sprung up, and over one hundred and fifty lots have been sold by the company that controls "Elk City", the town site on the northeast bank of the river. A comfortable hotel and several store buildings have been built. On the opposite bank of the river at Bear Point is "Smyth", a town site reserved by the government, and which is being sold by sealed tender. Here also a number of substantial buildings have been built, and it is understood that the Recorder's office of the Montreal River Mining Division will shortly be removed from Latchford to "Smyth" in order that the inconveniences entailed by long jour-



The Downey Claim, Near Silver Lake.

neys may be obviated. A few miles south on Mountain Lake a sawmill is in operation providing lumber for construction purposes.

Considering the fact that practically no systematic development work has been attempted, and that last season was by far the most unfavorable for prospecting for many years, this new silver camp has made a record that warrants a favorable belief in its future, and a belief that the spring and summer of 108 will see the development of a new mining district in northern Ontario, which will be an important factor in the silver production of the Dominion.

SUBMARINE COAL MINING.

By John Johnston, Sydney Mines, Cape Breton.

(Paper read before the Mining Society of Nova Scotia, 25th March, 1908.)

In preparing a paper upon the above subject, it is impossible to deal exhaustively with the many different phases which may present themselves, but for the present this paper will simply deal with the matter in a general way.

As is undoubtedly known to mining men, our principal heritage along the eastern seaboard of the County of Cape Breton is the valuable coal seams, from some of which the coal has been extracted for more than seventy years. The coal has been almost all taken from the land areas, and the quantity mined has increased in proportion to the demands of trade.

In 1902, the attention of Mr. H. M. Whitney and other capitalists was drawn to the rapidly increasing demands for coal, the possible expansion of the trade, and the necessity of reducing the cost of production, which eventually led to the amalgamation of a number of coal companies (whose operations as individual companies were not always attended with satisfactory results) into what has since been known as the Dominion Coal Company, Limited.

To the companies thus depending entirely upon water communication to reach a market for their product, conditions presented themselves which seemed beyond control, viz., shortness of shipping season and the need of a regular and continuous market, which subjected their business to extreme fluctuations, from producing all that was possible during the season of shipping, to enforced idleness during the winter months.

All this has been changed by the energetic action of far-seeing men, and since 1897 new markets have been found at home and abroad, requiring a constant supply of coal. Trade has expanded beyond the most sanguine expectations, and as a result collieries are required to work continuously, and labor has been given, not only to those who hitherto were compelled to remain idle during a large portion of the year, but to a largely increased number.

Up to the present there has been but little done in the way of submarine mining, except by the General Mining Association of London, which has been absorbed by the Nova Scotia Steel & Coal Company, which is at present continuing the workings. Mr. Henry S. Poole, of Halifax, N.S., read a paper before the Institute of Mining Engineers of England, at a meeting held at Nottingham, England, on September 3rd and 4th, 1903, and which is to be found in that society's transactions, in which he clearly set forth the conditions under which the coal in these submarine areas was then being extracted. The writer has much pleasure in confirming all that Mr. Poole has said relative thereto.

But a new condition of things is arising: certain well-known seams are rapidly being worked out on the land areas, and the necessity of generally extracting the coal from the submarine areas of our country, greater by far in quantity than that originally contained in the land areas, is becoming acute.

Naturally the question now is, not so much one regarding the extraction of coal from a submarine area extending about a mile from and parallel to the adjoining shore, but how should the operations in leases next to the shore line be undertaken, so as to enable investors to reach out several miles from the shore to extract coal therefrom, that they may have a fair return for the money invested; also, how should we guard with safety all those who may be engaged in the prosecution of the work, and how may we win the greatest possible quantity of coal from those areas, leaving uninjured the outlying properties and successfully meeting the requirements of trade?

These are problems of the highest interest, and in the proper solution of which, it appears to the writer, are involved matters that might be the duty of the government to investigate.

Extending for a distance of forty miles along the eastern seaboard of Cape Breton are coal-bearing strata, upon which, until a recent date, no submarine leases were granted, excepting those to the General Mining Association at Sydney Mines, at Barasois and at Lingan, to Charles Campbell at Burnt Head, and to the Blockhouse Company at Cow Bay. Recently, a large number of leases extending miles seaward have been applied for and granted—in fact all the distance mentioned has been covered. The descriptions in the leases have not always been accurate or clear, and litigation has arisen as a consequence, and more is likely to follow.

Two questions might here be asked. First: Why were not proper monuments for reference established, so there could not be any doubt about the location of each and every lease or area, whether submarine or land? And, second: Will not a large amount of coal be lost if the present apparently unsystematic distribution of coal leases is not modified?

In England, where this question has had the careful consideration of mining men for years, it has been demonstrated beyond a doubt that not only can coal be mined successfully in submarine areas in the usual way by bord-and-pillar, but, under certain conditions, all the coal can be extracted therefrom. It has also been demonstrated that the extraction of coal from submarine areas can be successfully done at quite a long distance from the shore line, as instanced at the White Haven collieries of Cumberland County, England, and several other places where coal is being extracted and drawn a distance of four or more miles. There the principal difficulty appears to have resulted from the number of faults, dislocations, anticlines and synclines which were encountered. So far as is known, the submarine areas of Cape Breton County are entirely free of any such conditions, and therefore are of very great value from a commercial standpoint.

In the mind of the writer, some of the principal questions to be considered (in addition to any that may have already been mentioned) are as follows:—

1st—How should this territory be successfully opened up so as to leave sufficient protection, and so as to extract coal five or more miles from the shore line in a manner that would give a fair return to the investor?

2nd—What is the best method of providing for ventilation, safety of workmen, haulage, and the extraction of the largest possible quantity of coal grom the several seams at this distance?

3rd—Where pillars are required to be left, what size should they be?

4th—Under what conditions should the different sections of a mine be worked?

5th—Can all the coal be taken in the first workings?

6th—Under what conditions can all the coal be extracted?

7th—What would be the proper method of procedure to lay out a mine in a submarine area where all the coal is being extracted?

8th—What is the most efficient method of ventilating workings in a submarine area, where coal is being extracted, two or more miles from the shore or exit?

9th—What is the most efficient system of haulage from submarine areas two or more miles from shore or exit?

10th—What is the best method of taking workmen to and from a given point two or more miles from shore or exit?

THE SIXTEENTH ANNUAL MEETING OF THE MINING SOCIETY OF NOVA SCOTIA.

Held at Halifax, March 25-28, 1908.



As indicative of the growing interest manifested in the annual meeting of the Mining Society of Nova Scotia it may be mentioned that four instead of two days, as heretofore, were necessary for the transaction of business, reading of papers, and social amenities. The attendance was large, the papers were timely and the discussion representative, although far too little time was assigned to this last item.

On Tuesday evening, March 24th, the annual meeting was opened informally by a "smoker" in the comfortable rooms of the Society's headquarters.

The formal opening took place on Wednesday morning, March 25th, in the commodious council chamber of the Halifax Board of Trade, which immediately adjoins the Society's quarters. As mentioned above, the attendance was good. In addition to the regular members

there were many guests from other parts of Canada and from the United States. Amongst these were Mr. R. W. Brock, Acting-Director of the Geological Survey; Dr. Eugene Haanel, Director of the Mines Branch, Ottawa; Dr. W. G. Miller, President of the Canadian Mining Institute; Messrs. Hugh Fletcher, E. R. Faribault and Leech of the Geological Survey; Dr. E. W. Parker, representing the United States Geological Survey; Mr. McLeish, Statistician of the Mines Branch, Ottawa; and Mr. J. C. Murray, editor of The Canadian Mining Journal, Toronto.

President C. J. Coll's address, entitled "Remarks on Some Recent Explosions in Coal Mines" was a valuable, lucid, and powerful review of recent coalmine catastrophies. After outlining the causes of these disasters, the address concluded with recommendation as to necessary regulations to be enforced in coal-mines. The whole address is reprinted in this issue if The Canadian Mining Journal.

Dr. Parker and Dr. Haanel discussed the president's paper. after which routine business was transacted.



President C. J. Coll.

The Wednesday afternoon session was followed in the evening by the Annual Dinner held in the St. Julian room of the Halifax Hotel. About one hundred and fifty covers were laid. Music was supplied by the band of the Royal Canadian Regiment. The speeches, all of which were admirably brief, were of unusual merit. Whether it is the proximity of the Atlantic Ocean or fish diet or some other factor unknown it is profitless to guess; but the truth remains that Nova Scotians speak fluently in public. Moreover, their hospitality induces eloquence in their visitors.

In responding to the toast of "Canada" Lieutenant-Governor D. C. Fraser referred to the Dominion's magnificent opportunities for development in the next twenty five years. The Hon. O. T. Daniels, M. P. P. speaking to the toast of "Nova Scotia" alluded to the sterling work done by the Mining Society. The Society, Mr. Daniels stated, had more than justified its existence by securing for Nova Scotia a system of technical education. Speaking to the same toast, Mr. C. E. Tanner, M. P. P. leader of Nova Scotia's loyal opposition congratulated the Society upon the earnestness and whole-heartedness with which it had attacked the problem confronting it.

The Hon. C. P. Chisholm, Commissioner of Works and Mines, responded to the toast of "Our Mineral Resources." He was followed by Judge Drysdale, a former occupant of that office.

Dr. W. G. Miller, President of the Canadian Mining Institute, spoke to the toast of "Our Sister Societies." "Our Guests" was responded to by Dr. E. W. Parker, Dr. Eugene Haanel and Mr. R. W. Brock. Other speakers were Mr. Hugh Fletcher, Mr. Badger, Mr. Faribault, Mr. J. C. Murray, Mr.W. W. Leech, Mr, H. E. Coll, Mr. H. Piers, Mr. F. H. Sexton and Mr. H. M. Wylde.

So well arranged was the whole affair that all making of speeches was over by midnight.

Part of Thursday's and Friday's sessions were devoted to the discussion of what had been chosen as the keynote of the meeting—the exploration of Nova Scotia's mineral resources. Dr. Haanel, Mr. Brock, Dr. Miller and Dr. Parker spoke inspiringly upon the work of the bureaus that they individually represented.

Beside the regular papers read, Dr. Miller on Thursday afternoon delivered, before a large audience, a lecture on Cobalt. After showing Cobalt's relation geologically to the surrounding sections of Ontario, he traced its history and development. The lecture was illustrated by lantern slides.

An incomplete list of papers read and discussed or read by title is:—

W. J. Priske—"The West Gore Antimony Mine." H. E. Coll—"Shaft Collar at No. 1 Allan Shaft." A. L. McCallum—"The Testing of Nova Scotia Fire Clays." H. S. Badger—"The Mining and Metallurgy of Gold at the Boston-Richardson Mine." T. J. McKavanagh—"Electricity in Mining." A. A. Hayward—"Gasification of Fuel." J. E. Woodman—"The Financial Value of Economic Geological Studies." E. Percy Brown—"Structure of the Ore Body of the Boston-Richardson Mine." J. Read—"Recent Cyanide Practice in Mexico." J. E. Woodman—"The Mapping of Mining Properties." A. A. Hayward—"The Occurrence of Primary and Secondary Brines."

The election results, announced on Friday afternoon were as follows:—President, Mr. C. J. Coll; 1st. Vice-President, Professor F. H. Sexton; 2nd. Vice-President, Mr. T. J. Brown; Sec-Treasurer, Mr. H. M. Wylde; Council, Messrs. R. H. Brown, A. Dick, G. W. Stuart, Jacob A. Johnson, B. F. Pearson, Hon. R. Drummond.

A PRACTICAL SUGGESTION FOR THE TESTING OF THE GOLD MINES OF NOVA SCOTIA.

By Fred. P. Ronnan.

Editor "Industrial Advocate."

(Read before the Mining Society of Nova Scotia, 25th March, 1908.)

Various plans have been suggested for the encouragement of gold mining in Nova Scotia, and the necessity for taking some practical steps in the development of that branch of the mining industry will be admitted without debate by all persons who have witnessed the slow and irregular progress of the past ten years in Nova Scotia. It is to the credit of the government of Nova Scotia that it has signified its willingness to extend any reasonable measure of financial assistance that may be

necessary, and this desire has found expression in the placing on the statute books of Nova Scotia an Act directed to the extending of financial help to mining operators of responsibility and standing, who will undertake to carry on deep mining.

So far as it goes, this is praiseworthy, but no move has yet been made by capitalists to take advantage of this exceptionally favorable proposal; and to any person who has devoted a reasonable amount of time to the study of what is required in this province, it is plainly manifest that some more practical means of realizing on our great mineral deposits must be put into force, not only through the initiative of persons engaged, but in the necessary oversight by the authorities. It would be idle to recall to the reader's recollection the various facts which have been proved in connection with the wide extent and distribution of the gold-bearing deposits of this section of Canada. These are patent to persons who have made only a cursory study of the subject; and in fact, as one authority has frequently put it, the chief trouble with Nova Scotia is that there are so many openings and opportunities for the investment of capital in gold mining, effort and capital are in consequence divided, and the result is a want of concentration, which on one or two properties would prove them to be very successful and object lessons to those who think that our gold deposits have only a limited range in depth and value. There are without doubt in this province to-day, as many as a thousand "gold mines," so-called. To the owners, no doubt, they are such, but in the opinion of the hard-headed, matter-of-fact mining engineer they are but prospects, and as such will remain, unless development work is undertaking on the best possible lines. Almost all these properties have had more or less money expended upon them, much of it wasted so far as actual results are concerned. The majority of them have engineer's reports concerning their value and extent, but still the industry lags, and Nova Scotians possessing, as they do, a splendid mining country, are last to become interested financially in the proper development of these deposits. Indifference and dishonesty there are in all mining sections of the world, and if we suffer from either one or the other, or both of these conditions, we are not alone in this respect: but there is a remedy for even these causes, and I propose to submit to the mining men of the province and others interested a plan which I think might at least be found worthy of trial, or at all events worthy of criticism from the standpoint of the desire to improve our present position, as a producer of precious metals. In view of the fact that political elements will enter into even the most carefully restricted questions, and that further, sectional jealousies are always more or less apparent, it is necessary that a suggestion to improve mining conditions must be based on some plan by which these considerations will be eliminated, and I submit as the result of some study of the question, the following plan, which while not put forward as one that is absolutely perfect or free from flaw or objection, is one which seems to me fairly well calculated to meet a condition as it exists to-day in this most important industry.

If I had the honor and responsibility of filling the chair or Department of Mines in Nova Scotia, I would start the ball rolling by inviting the attention of all practical mining men to the fact that the government is prepared to undertake gold mining development with the sole object in view of creating a very much wider measure of interest in the same than at present exists. I would next issue an invitation to all owners of gold mines throughout Nova Scotia to forward to my department within a certain date, as complete a description of their property as they could furnish, accompanied by maps, mill returns, etc., and also an offer in a formal way, of the property to the government at as low a price as they consider they could accept. I would ask them each to specify that the government would have the right to a three year's working option, if required, without charge.

I have not the slightest doubt that the response to such an invitation would be a most generous one. I would employ two or three practical mining engineers who have had the necessary training in picking out prospects which promise the making of good mines, and whose judgment in nine out of ten cases is usually found correct, as verified in many western camps. I would then take the most promising property selected by those experts, one from each district, and on a certain day to be determined, in the presence of those interested, I would draw by lot the property to be exploited. In this manner I would avoid, as far as possible, any charge of partiality toward any district or any one property, and I believe it would be the only way to determine which one of, say a dozen properties, each equally promising, should enjoy the first attention. With the property selected, then I would map out, or have my engineers plan a scheme of development for the purpose of placing in sight bodies of ore, and in short the making of a mine. I would then ask for an appropriation of sufficient money to carry on this work and see that it was prosecuted vigorously and scientifically to its logical conclusion.

We will assume, for instance, that after selecting the property in this manner, that it has been decided in consultation to spend up to the sum of $50,000 in making a mine of this prospect, and assuming further, that as the result of six month's careful underground work the results are satisfactory from an engineer's standpoint in the way of producing a measureable pay ore body, then I would hand the property back to the original owner and relinquish the option of purchase, letting him have the benefit of the expenditure so far incurred, and which had not resulted as expected, leaving him to carry on any further work.

I would then repeat the operation as already described on another property, and we will assume, for illustration, that the second property as the result of the expenditure of, say $50,000, within six months is so far satisfactory as to warrant a still further amount, and we will assume that conditions keep improving, and that after two years' working we have made a mine which may be submitted to the most exacting tests required by competent mining engineers, then I would as Minister of Mines inform the owner that the government would exercise its option of purchase on the price first agreed on, and the property would then belong to the people of Nova Scotia, together with all improvements. If it were thought necessary to carry on the development still further, very good. But if already in a position to be called a mine, then I would cause to be prepared a full, frank and complete statement of the property, describe it in detail, illustrate its ore occurrences, the tonnage of ore that had been developed, and such other facts as may safely be predicted by an undertaking of this kind. I would advertise this property in the leading mining and financial journals of England, Europe, United States and Canada, stating that on a certain date in the future this property, as described, would be offered for sale by public auction to the highest bidder, thus provoking com-

petition from the keenest mining investors all over the world and backed by the unquestionable evidence of actual ore bodies blocked out, and with their qualities, there would be little difficulty, in my opinion, in effecting a sale at a price far beyond the original cost of the property and the improvements. The sum derived from such a sale would then be turned into a fund for repeating the operation indefinitely in the various districts as fast as they could be reached, thus permitting an absolutely necessary work being carried on without cost to the government, and focusing attention upon one of the most valuable possessions which this province enjoys, viz., its undeveloped gold resources. The operation would then become continuous, and with the steadily added string of mining properties which had been proved beyond question, would come a very great revival of interest and enthusiasm in our properties, and it might even be unnecessary for the government to continue the programme unless its merits had entitled it to a foremost place as a practical method of progress.

The above is a hastily outlined sketch of what I think I would be very strongly tempted to undertake if I were to be placed in a position to do so. I submit it to the consideration of the members of the Nova Scotia Government, and in particular to the Hon. Mr. Murray and his associates, who, I am sure, have the future development of the country at heart, and while there may be, and doubtless are, minor obstacles in bringing about such a measure of improvement, yet I do not believe they are great enough to be considered insuperable. If there are any arguments, objections, unforeseen contingencies, or any other possible obstacles in the way of putting such a plan in practice, I invite most earnest the criticism, friendly or otherwise, of this plant. I believe at the present writing that it is entirely feasible and within the reach of practical application, and I cannot conceive of any other than a favorable outcome to such an attempt, but in case there should be, I would be glad to review whatever objections may be urged against a trial at least of the methods suggested. We ask the mining men of this province to take up this matter seriously. Study it in all its bearings, and let us have as full a criticism of the subject as it will be possible to make. The matter could be extended to many more pages, indeed, by the addition of detail, not necessary to the present outline, but the main skeleton of my plan is shown above, and could be readily approved or disapproved at less cost than any other method, more particularly that which depends on the unorganized individual attempts to mine gold in Nova Scotia with insufficient capital, inadequate knowledge and very often incompetent management.

REPORT OF THE DEPARTMENT OF MINES, NOVA SCOTIA.

For the year ended September 30, 1907.

In our last issue we published the statement of the mineral production of Nova Scotia during the past fiscal year and noticed editorially the general aspect of that province's mineral industry. But the 'Report' calls for more attention than it was then possible to give.

From October, 1906, to July, 1907 the province paid in bonuses on each ton of coal consumed in the manufacture of iron and steel in Nova Scotia, the amount of $40,331.45 of which the Dominion Iron & Steel Company received nearly three-quarters. The remainder was divided between the Londonderry Iron & Mining Company and the Nova Scotia Steel & Coal Company. The Dominion Iron & Steel Company receives 6 1-4 cents per ton; the other two companies, 5 cents.

Coal.

The returns of coal sold during the year 1907 show, compared with the returns of 1906, as follows:

	1906	1907
Nova Scotia	1,962,206	1,842,419
New Brunswick	434,882	427,128
Newfoundland	149,506	146,502
Prince Edward Island	76,809	77,493
Quebec	1,739,308	1,709,592
West Indies	.....	2,598
United States	769,775	616,312
Mexico	.....	7,591
Other countries	62,104	12,483
Bunker	.....	204,572
Total	5,194,590	5,046,690

The reports of the deputy inspectors on the collieries of the province are given in full. They contain much useful information; but are somewhat diffuse. In looking over them we notice some facts that are significant. We shall group these facts under separate headings and thus cover the field roughly.

Lamps.—Bonneted Marsaut lamps are used at the Springhill collieries. They were introduced in March 1891. 1300 are on hand in the lamp house and 1,150 are in use. The Marsaut is supplied with double gauze chimneys,

At Joggin's Mines Meuselers are used. They were introduced in January, 1904 and 200 are in commission.

The Chignecto mines use open lights. The slope is down 1,800 feet. The Minudie also use open lights.

The Dominion Coal Company's Dominion No. 1 colliery has used closed lights since 1903. There are 750 Ackroyd and Best safety lamps here, of which 600 are in use.

The use of the safety lamps was commenced at the Sydney No.1 colliery of the Nova Scotia Steel & Coal Company in 1897. There are now 680 Marsaut safety lamps in daily use. At the same company's Sydney No. 5 colliery there are 173 Marsauts.

The Port Hood colliery uses open lights. The Mabou and Gulf Coal Company and the Inverness Railway & Coal Company also are without safety lamps.

The Intercolonial Coal Company 18 years ago began using safety lamps. 640 Marsauts are in commission a reserve of 120 is kept in stock.

The Acadia Coal Company uses, at their Vale colliery, a total of 272 safeties, of which 78 are Marsauts, 64 Mueselers, and 130 Clannys. At their Marsh mine open lights are used. The Wolf safety lamp (self lighting) is used at their Acadia colliery to the number of 220, 385 of these lamps are used at their Albion mines.

The Dominion Coal Company's Dominion No. 2 colliery is equipped with 1,000 Ackroyd and Best safeties. These have two gauzes and are lighted and unlocked by electricity. Dominion No. 9 has 600 of the same type. At the Hub colliery 100 Hughes safety lamps are employed. There are also 738 Ackroyd and Best lamps at the Caledonia colliery, 500 at Dominion No. 3 colliery, 220 at the Emery colliery and 1,076 at Reserve. At Dominion Co. 6 there are 324 Marsaut safeties.



Hiram Donkin, Esq.
Deputy Commissioner of Mines for Nova Scotia.

Explosives:—

Colliery and explosives used	Output of Mine. Tons
Springhill No. 2, Springhill No. 3, dynamite	339,039
Joggins mines, black powder	50,385
Chignecto mines, black powder	44,143
Minudie mine, No. 3, black powder, American blasting powder, dynamite	44,107
Sydney No. 1, Sydney No. 3, Sydney No.5, "Bull Dog"	664,484
Port Hood, No. 3 black	76,083
Inverness Ry. & Coal Co., black powder	261,004
Allan Shaft No. 1, Monobel powder, Vale, No. 3 black, Marsh mine, No. 3 black, Acadia, none, Albion mines, Monobel	385,006
Dominion No. 1, Bulldog, Dominion No. 2, Excelite, Dominion No. 9, Bulldog, Hub, Bulldog, Caledonia, Bulldog, Dominion No. 3, Bulldog compressed, International, Bulldog compressed, Emery, Bulldog and Balfurite, Reserve, Bulldog and Excelite, Dominion No. 6, Bulldog	3,456,937
North Atlantic, Bulldog (loose) and Acadia pellet	981

The composition of Monobel powder, manufactured by the Nobel Explosive Company of Glasgow, is given as follows:—

	Maximum	Minimum
Nitrate of ammonia	82	78
Nitro-glycerine	11	9
Woodmeal (dried at 100 degrees C.)	10	8
Moisture	2½	½

Gold.

The production of gold during 1907 was 15,006 ounces. For 1906 it was 14,079 ounces. The gold produced, excluding that obtained from the antimony ore shipped from West Gore, was 13,687 ounces, valued as $260,053, extracted from 64,657 tons of ore, representing an average return of $4.02 from each ton of ore mined and milled. Compared with 1906 this shows an increase of 639 ounces of gold cecovered, 162 tons of ore milled and 18 cents in value per ton. Twenty four mines were operated and 483 men employed. In two districts, Gold river and Middle river, new properties were opened up.

Wages.—The average wages paid to the different classes of labour, skilled and unskilled, at the different gold mines in the province, is as follows:

	Per day.
Shift bosses	$2.00
Machine drill men	1.75
Machine helpers	1.50
Timbermen	1.75
Trammers and muckers	1.40
Engineers	1.60
Blacksmiths	2.00
Blacksmith helpers	1.50
Amalgamators	2.50
Millmen	2.00
Ordinary labour	1.35

Cost of Coal.—The cost per ton of coal at the boilers of the different gold mines throughout the province varies greatly, and depends principally upon the method of transportation, distance of the mine from tide-water or railway station, and quantity purchased. The following figures in this connection, covering over half the gold produced during the year, may prove of interest.

To mine and mill 51,725 tons of ore from which 8,156 ounces of gold were extracted valued at $154,964.00 or $2.99 1-2 per ton, 7,097 tons of coal were used costing $26,418.05 or $3.72 1-4 per ton, being $0.51 for each ton of ore mined and milled, $3.24 per ounce of gold extracted or $0.17 for every $1.00 worth of gold recovered.

Guysboro County.—Boston Richardson Mining Company, Isaac's Harbour. Employing 104 men this mine produced 43,456 tons of ore, yielding on the plates and by cyanide 6,504 ounces of gold, an increase of 1,685 ounces of gold extracted.



Minnie Miller Lead, Moose River Caribou.

Mining is done mostly by contract. Last year's prices for different classes of work were as follows:

Sinking incline shaft..$12.00 per foot, shaft 23 x 10 feet.
Driving ....4.25 per foot between walls 9 feet high.
Stoping ....18 cents per superficial foot through the belt.
Cross-cutting..... .....$4.50 per foot, 10 feet wide, 7 feet high.

In sinking, drifting and cross-cutting, the contract includes breaking down and delivering ore to the skip. The contractors supply steel, dynamite, light and general supplies; the company providing drills, hoisting and tramming facilities, timber when necessary, and air at 90 pounds pressure, at drills. Drill parts broken or lost are charged against the contractors. The management at the mine state that this method is giving splendid satisfaction, both to men and company.

The cyanide plant produced 1,101.12 ounces of bullion out of the total of 6,504 ounces.

Several shipments of concentrates have been made to Germany for arsenic extraction tests. If these prove satisfactory a plant will be erected at the mine.

Beaver Hat Gold Mining Company, Lower Seal Harbour. Twenty men are employed. A total of 1936 tons crushed yielded 635 ounces of gold. The mine was closed for 1 1-2 months on account of shortage of coal and three months during construction operations. The mill is equipped with ten 800-pound stamps.

McDonald and Copeland (Modstock) Forest Hill. Thirty six men employed. From 155 tons of quartz mined and crushed 375 ounces of gold were extracted.

The Wine Harbour Gold Mining Company, Wine Harbour. Forty two men employed. 6,333 tons of ore crushed yielding 1,017 ounces of gold.

Halifax County.—Ecum Secum Gold Fields Limited. During eight months 456 tons of ore were crushed giving 339 ounces of gold.

Harrigan Cove Gold Mining Company, Harrigan Cove. 1,267 tons of ore yielded 259 ounces 10 dwts. of gold.

Dominion Mining Company, Tangier. 647 tons of quartz yielded 201 ounces 15 dwts. of gold.

Dixon Mine, Caribou. From 174 tons of quartz crushed, 119 ounces 18 dwts. gold were extracted.

Consolidated Mines of Canada, Moose River. 2,895 tons of ore returned 219 ounces of gold.

Oldham Sterling Gold Company. From 362 tons of ore, 853 ounces 3 dwts. of gold were extracted, a yield per ton of 2.36 ounces. During the two months of August and September the returns show 67 tons crushed and 274 of gold extracted, or almost 4.01 ounces per ton.

Lunenburg County.— Chester Basin Gold Syndicate. From 761 tons of quartz a total of 926 ounces 9 dwts. was obtained. Hand steel was used. The mine is operated wholly by water power.

Reardon Reeves Property. A crushing of 72 ton 16 cwts. of quartz gave 278 ounces 12 dwts. of gold. The property was worked on tribute.

Micmac Gold Mining Company, Leipsigate. 2,583 tons of ore yielded 683 ounces 17 dwts. of gold and 116 ounces 8 dwts. of silver.

Hants County.— Dominion Antimony Company, West Gore. 3,042 tons of auriferous antimony were mined during the year. Of this 1,403 tons were shipped, most of which was No. 2 or "20 per cent." ore. The average amount paid to the company was $48.39 per ton. The ore contained 1319 ounces of gold, only part of which was paid for by the smelters. The purchasers were:—Hoyt Metal Company, Matherson & Company, Meallgesellschaft, Merton & Company, and the American Metal Company. The ore shipped contained from 17.58 per cent to 45.12 per cent. antimony and from 0.77 to 2.06 ounces of gold per ton.



Cameron Lead, 120 Feet Level, Ecum Secum.

Iron Ore.

The total amount of iron ore mined during the year was 48,337 tons, from the following districts: Torbrook 29,085 tons; Londonderry, including East mines,15,557 tons; Brookfield, 3,406; George's River, Cape Breton County, 289 tons.

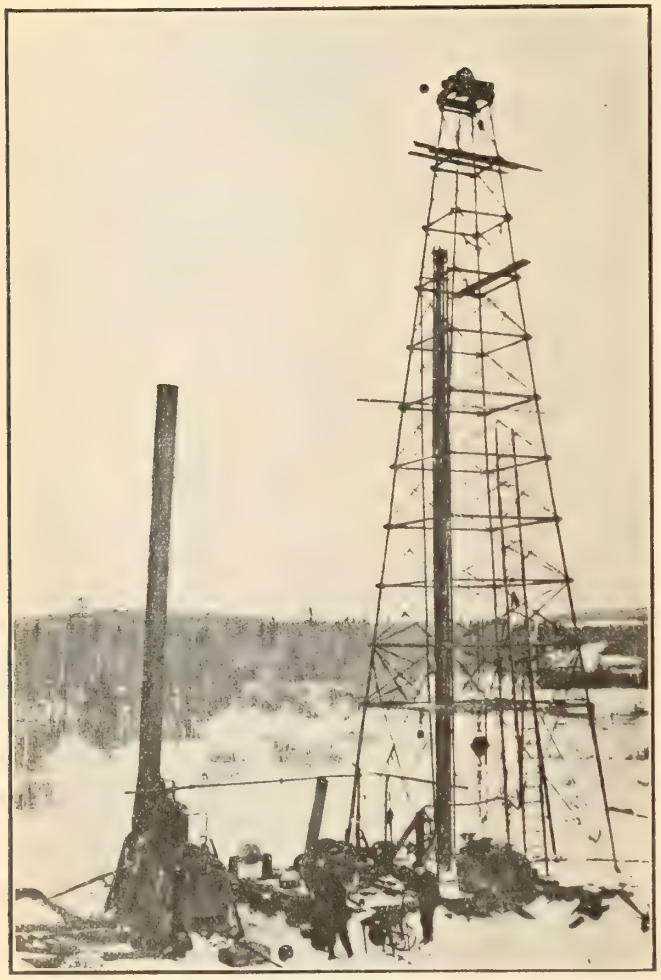
Copper.

Colonial Copper Company, Cape D'Or. This company mined and concentrated 1971 tons of ore from which was produced 12,320 pounds of copper.

The copper smelter at Pictou was in operation but a few months. Newfoundland and New Brunswick ores principally were treated.

Cement.

The Sydney Cement Company manufactured 58,762 barrels of slag cement, which was marketed in Eastern Canada and Mexico.



Government Drill No. 6.
(Steam Calyx, 6 inch. Core capacity, 3000 feet.)

Gypsum.

Ten companies quarried and shipped gypsum to the total amount of 332,345 gross tons. This is a large increase over 1906 and is the largest amount ever shipped in one year. Practically the whole output was shipped to the United States.

Government Drills.

The government owns seven diamond and calyx drills-three steam calyx, one steam diamond, two hand diamond and one hand calyx. The drills are stored and repaired at Hantsport.

In 1907 a total of 6,273 feet of boring was performed at a cost of $3,247.31 to the department. This is a record in work done. The outlay of money also is lower considerably than in any previous year. The average cost per foot for all drilling done is creditably cheap, being about $1.50 per foot. Indeed in the past two years 9,112 feet have been bored at an average cost of $1.19 per foot. Only three holes were lost last year.

The total cost per foot for carbon wear with the diamond drills was 1.29 cents against 4.7 cents for shot for the calyx drills.

The total average cost per foot bored by the diamond drills was 0.73 and by the calyx drills $1.71.

The fastest average rate of boring was 1.75 feet per hour with a steam diamond drill, sinking in sandstone.

WAGE SCALE AT COBALT.

From the March Labour Gazette the following Cobalt wage scale is taken:—

Carpenters	$3.50
Mechanics	3.50
Pipe lifters	3.00
Blacksmiths	3.50
Helpers	2.75
Engineers, nine hours	3.25
Over nine hour, 32 1-2 cents an hour	
Firemen, nine hours	2.75
Over nine hours, 27 1-2 cents an hour.	
Ore sorters	2.75
Hammermen	3.00
Teamsters	2.75
Hoistmen, nine hours	2.75
Over nine hours, 27 1-2 cents an hour	
Cage or bucketers	2.75
Other labour on the surface	2.50
Underground.	
Timbermen	$3.50
Machine men	3.50
Helpers	3.00
Cage or bucketers	2.75
Other underground labour	2.75

TREATMENT OF GRAPHITE.

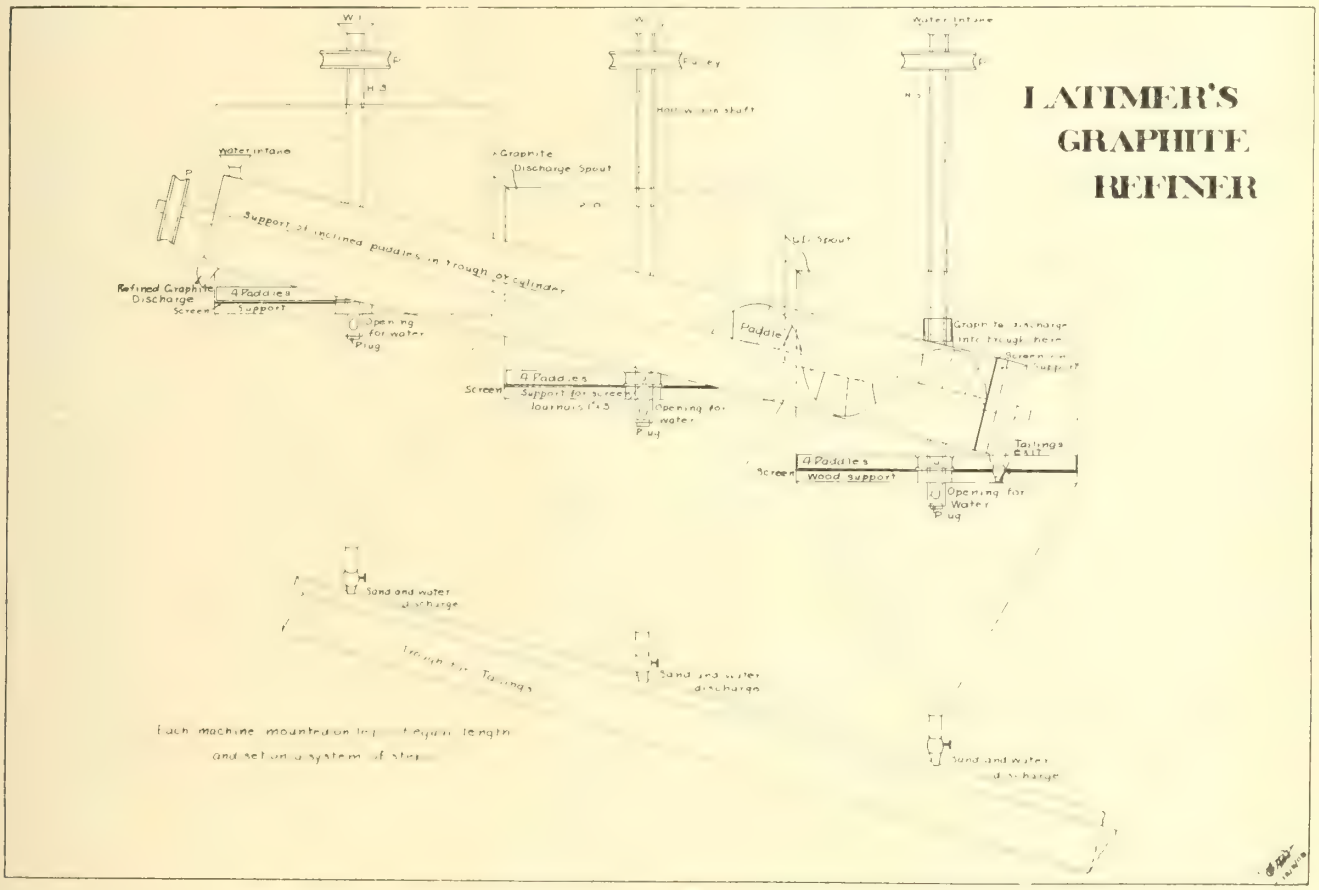
Mr. J. F. Latimer, a well-known assayer of Toronto, has after a long series of experiments, succeeded in perfecting a process for refining graphite by which he claims to be able to extract in high grade condition from 75 to 90 per cent. of the graphite contained in the ore. The process and the apparatus for employing it are covered by patent.

The following is a brief description of the apparatus and its application. The apparatus employed consists of an upright cylinder or drum open at the top and funnel shaped at the bottom, with a water tap at the apex to permit of the discharge of tailings. A screen is placed across the drum just above the funnel-shaped bottom on a firm support. A hollow shaft through the centre of the drum passes down through the screen, and is boxed in the screen support. Adjustable paddles are fixed to the shaft just above the screen. The hollow shaft is revol-

ved by a pulley above the drum, carrying the paddles around longitudinally at such velocity as is found requisite.

In operation, the pulverized ore is first mixed with a small proportion of crude oil, which causes the particles of graphite to cohere and so prevents them passing through the screen. Water is now allowed to flow down through the hollow shaft till it begins to flow up through the screen, then the prepared graphite is fed in near the centre of the drum. The sand or rock particles to which the oil does not adhere passes down through the screen, while the graphite is carried upward along the sides of the drum and up an inclined way and out through a spout near the top of the drum, automatically into a second or if desirable into a third drum, and thence, if deemed requisite, into an inclined trough, up which it is carried against a stream of water by a series of inclined paddles and discharged at the upper end not only free from sand but with all the dust washed away. The tap at the apex-shaped bottom being sufficiently opened to permit the tailings to escape, sufficient water is admitted through the hollow shaft to cause a suitable overflow at the top of the cylinder to carry over the graphite.

Calcic material treated in this manner was found after treatment to contain not a trace of lime.



Mr. Latimer states that arrangements are being made for utilizing some promising properties in Central Ontario by this process.

We wish this and all other inventions and enterprises undertaken for development of the natural resources of the country unqualified success.

Mr. W. H. Matthews of this city is associated with Mr. Latimer in handling this process.

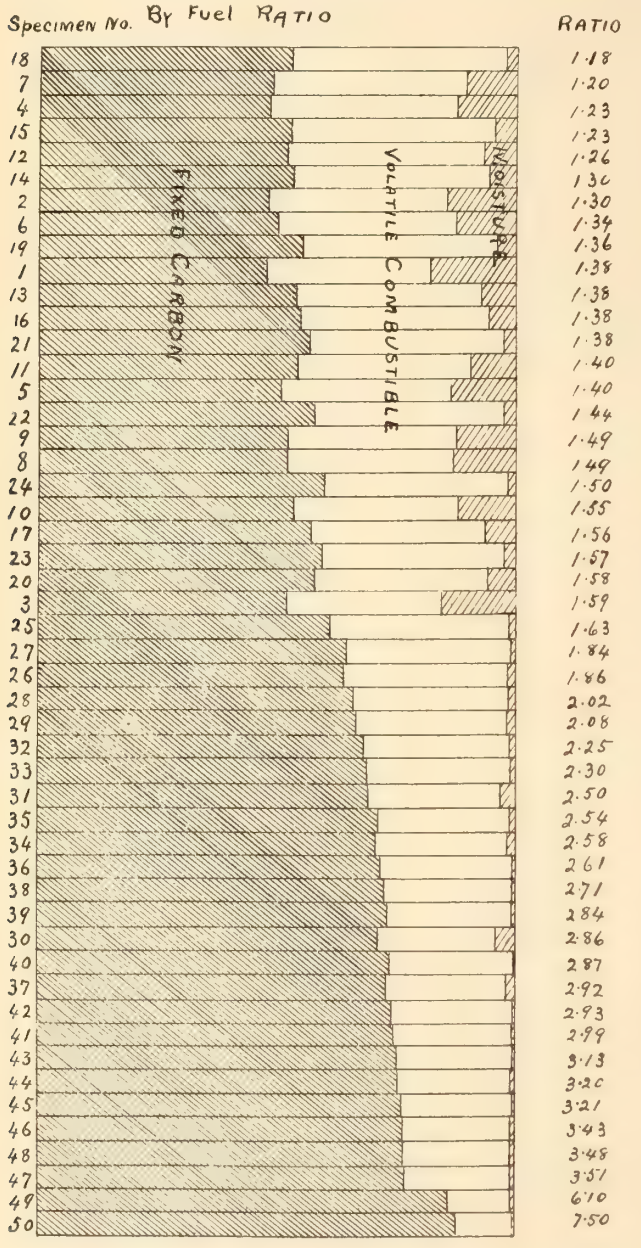
CLASSIFICATION OF COALS BY THE SPLIT VOLATILE RATIO.

D. B. Dowling.
(Written for The Canadian Mining Journal).

Efforts to classify coals by the results obtained in proximate analyses only, have been mere approximations owing to the different methods pursued in the laboratories in the determinations of moisture and volatile combustible matter. Were uniform methods adopted it seems possible that a system of classification could be arrived at that would meet the needs of the general public. It is true that the ultimate analysis of a coal should be the proper basis for classification, and the carbon and hydrogen contents seem to be the principal items to be considered.

With the prospector and the general public supplied with an approximate analysis only, some scheme must be devised whereby they can judge of the proper grade of their coal without the added expense and loss of time in getting an ultimate analysis made.

With this end in view, as far back as 1877 Professor Persifer Fraser proposed for the coals of Pennsylvania that the fuel ratio be adopted—that is, the ratio obtained by dividing the fixed carbon by the volatile combustible matter. As these coals all contained a very small percentage of moisture, the fuel ratio served very satisfactorily as a means for grading them. When the western coals came to be examined it was found that the moisture content played a more prominent part and for these coals the fuel ratio did not serve as a true index. It was next proposed that for the poorer coals that the



moisture content be taken as an index, and all coals having over ten per cent. moisture be classed as lignites. This has been found to be unjust to many coals, such as those of Missouri, and some other scheme has to be devised.

In the paper under the heading Classification of Coals that the writer read before the March meeting of the Canadian Mining Institute in Ottawa, the proposal was made to use as a ratio for classification the following: Fixed carbon + ½ volatile combustible over Moisture + ½ volatile combustible. The analysis to be of an air dried coal.

To test the value of this ratio it was applied to the coals classified by the United States Geological Survey from the results of the St. Louis trials, using the ultimate analyses as a basis. The result gave a list which did not materially disarrange their position as given in the official scale, the greatest variation being in the centre or among the bituminous coal, the poorer grades following very closely the proper order and the position of the harder coals not being disturbed.

With the exception of cannel coals and coals altered by intrusions, such as those of the Telkwa River, B.C., it is hoped that the ratio proposed will serve for a working guide.

To illustrate the arrangement both by *fuel ratio* and *split volatile ratio* two diagrams have been prepared, in which a list of fifty coals are plotted, excluding the ash as not being a part of the fuel, on the same scale. The first diagram illustrates the order that would be given by arrangement according to fuel ratio, or the old Pennsylvania system. It will be seen at once that the better grades are arranged very nearly as they should be, but that for the poorer coals no one could agree that they were at all satisfactory.

In the second diagram they are again given in the order in which the split volatile ratio would place them, and in this it would seem that the better coals maintain their relative positions as in the old fuel ratio, and also that the low grade coals are in a more rational order.

A third diagram might be constructed to show the arrangement by either moisture or fixed carbon content, but it is evident that either one could not be used without considering the other and the arrangement would not be of much value.

Calorific Value.

The researches of Messrs. Parr and Hamilton, of the University of Illinois, published in Bulletin No. 17 of the University, have conclusively shown that there is a rapid deterioration in the coal from the moment it is brought from the mine, and unless the examination is made within a short time of the sampling the maximum results are not obtained. Exposure to the open air is proved to be generally far more destructive to the fuel value than if the coal is kept submerged. The loss in seven months from outdoor exposure varies from 2 to 10 per cent., so that samples from natural exposures can be no guide to the fuel value of the coal. The list of coals discussed in these notes are, in the majority of cases, from the outcrops and therefore to test the scheme of classification by referring to the calorific determination it would be necessary to have also a uniform method of sampling which would exclude all weathered coal. To show that these coals are weathered and some even kept for an undue time before examination, it is only necessary to refer to diagram No. 3, in which the calorific value for pure coal in B.T.U. is plotted to go opposite diagram No. 2. As it is impossible to get a maximum line for this series an approximate one is plotted from a similar series in the St. Louis experiments, which are as near fresh mined coal as we are apt to get. The specimens which give results approaching this maximum are from mines marked with an X and a few others, which are evidently samples taken by digging into the seam to beyond the badly weathered portions.

No. 30, the one which shows the poorest result or the greatest deterioration, is a sample collected by the writer from a seam that was discovered when he did not have a shovel, and the surface was scratched over by a ham-

mer. The coal was weathered to dust and the samples were handsfulls tied up in a handkerchief.

No. 46, from Fernie mines, was very high in ash, and it is just possible that the sample burned in the calorimeter did not have as high an ash content as the portion assayed, so that the slight change in per cent. (the coal had about 15 per cent. ash) would easily disturb the result.

The diagram will show the necessity of obtaining fresh samples and having them analyzed shortly after collection.

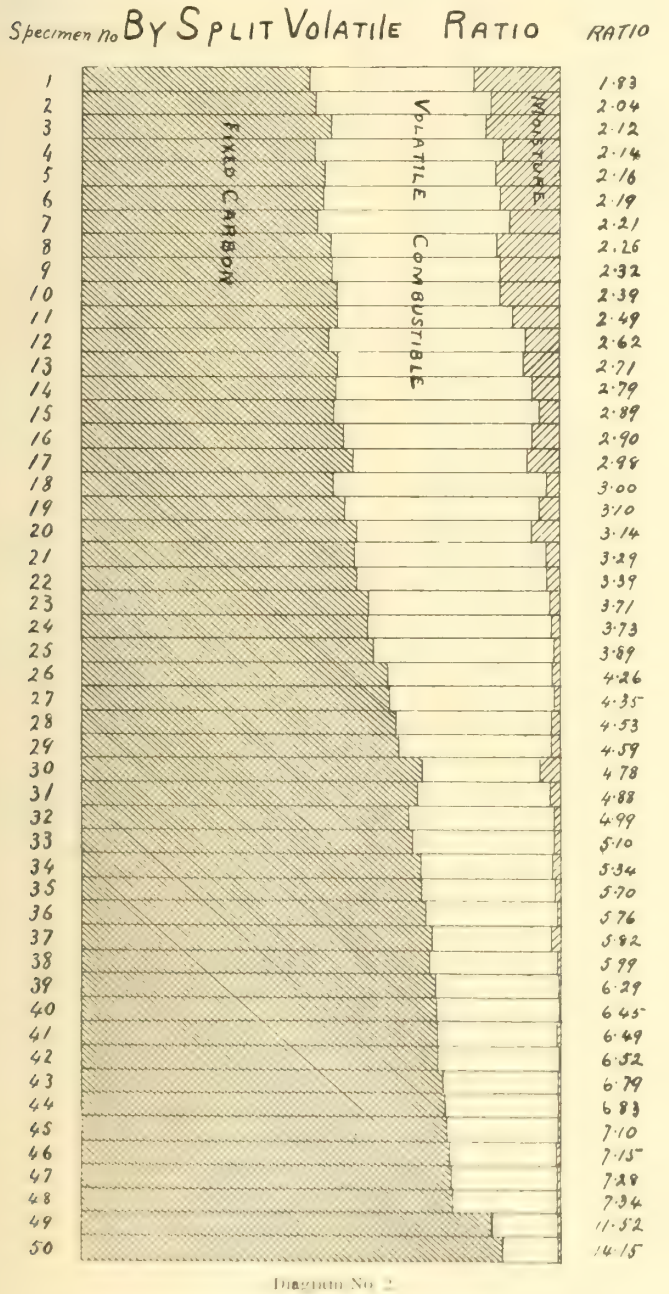


Diagram No. 2.

It also gives us a clue to another line of enquiry that would be profitable. It has been shown that from the maximum the deterioration is rapid at first, but pursuing this to trace the curve for the deterioration for subsequent time means a long wait. Could we not start at the weathered coal and trace it back into the seam until we arrive at the maximum and so determine the depths to which coal is subject to this loss from the air exposure, as well as finding at the same time the maximum loss to which each coal is liable?

If it were not for this trouble with weathered specimens, it seems to the writer that the scale of classification could be so plotted that the coal could be put in its proper place and an idea of its fuel value given, as is suggested in diagram No. 3.

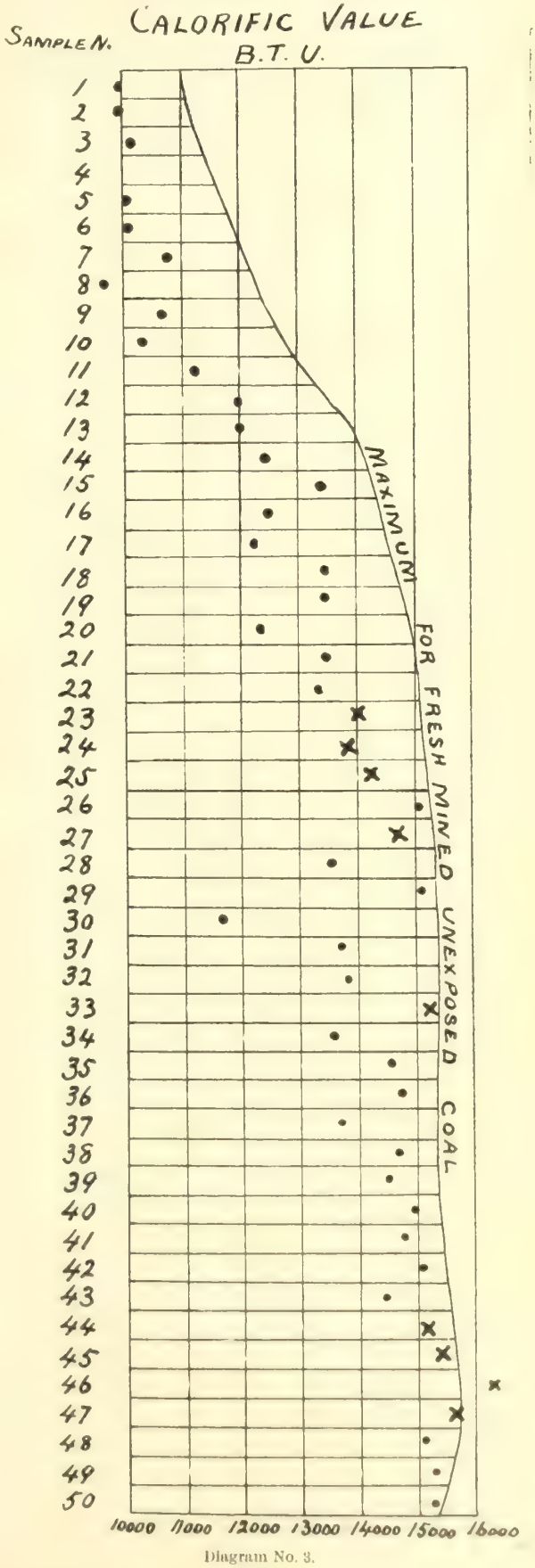


Diagram No. 3.

Note.—As several of these analyses are over 20 years old and the samples are still to be found, it would be interesting to repeat the analyses as nearly under the same conditions as to apparatus and moisture content as at first, and find the effect of air exposure for a period of upward of 20 years in some cases.

The list of coals used for the diagrams are from the following localities:—

No. 1. South Saskatchewan, 10 miles above Medicine Hat.
No. 2. Red Deer River, 7 miles above Hunters' Hill.
No. 3. North Saskatchewan River. Big seam at Goose Encampment.
No. 4. North side of Milk River Ridge, thin seam.
No. 5. Red Deer River, near mouth of Rosebud River.
No. 6. Bow River, seam 4 feet 6 inches on Grassy Island.
No. 7. Prairie Creek, Athabaska River. Coal Creek branch.
No. 8. Edmonton, seam 6 feet, in banks of river.
No. 9. Athabaska River, near mouth of McLeod River.
No. 10. Bow River, near Blackfoot Crossing.
No. 11. Belly River, 5 miles below Little Belly River.
No. 12. Belly River, main seam at Coal Banks.
No. 13. St. Mary River, 7 miles from Bow River.
No. 14. Prairie Creek, Athabaska River, near Forks.
No. 15. Belly River, near south end of Blood Reserve.
No. 16. Bow River, Coal Creek, west of Cochrane.
No. 17. Highwood River, north fork.
No. 18. Near Lundbreck, lower seam on Crow's Nest River.
No. 19. Near Lundbreck, upper seam on Crow's Nest River.
No. 20. Pincher Creek seam at Government Indian Farm.
No. 21. Wellington Mine, Nanaimo, Vancouver Island.
No. 22. Pine River, 5 miles above Lower Forks.
No. 23. No. 5 Southfield Mine, Nanaimo, Vancouver Island.
No. 24. Harewood Mine, Nanaimo, Vancouver Island.
No. 25. Extension Collieries tunnel vein, Nanaimo.
No. 26. Marlen Creek, B.C., Peter seam.
No. 27. Union Mine, Comox, Vancouver Island.
No. 28. Mill Creek, Alberta, 4 miles above mill.
No. 29. Marten Creek, B.C., Jubilee Seam.
No. 30. South Branch Brazeau River, seam No. 6.
No. 31. South Branch Brazeau River, seam No. 5.
No. 32. South Branch Brazeau River, the Big Seam.
No. 33. Union Colliery, Comox, B.C., Pit No. 5.
No. 34. South Branch Brazeau River, Kidd seam.
No. 35. South Branch Brazeau River, seam No. 2.
No. 36. Saskatchewan River, opposite Bighorn Range, seam No. 3.
No. 37. North Fork Old Man R. or Livingstone River, near gap.
No. 38. South Branch Brazeau River, seam No. 1.
No. 39. Bighorn River, seam No. 2, branch of North Saskatchewan.
No. 40. Saskatchewan River, opposite Bighorn Range, seam No. 4.
No. 41. South Branch Brazeau River, seam No. 4.
No. 42. South Branch Brazeau River, seam No. 8.
No. 43. Bighorn River, seam No. 3.
No. 44. Morrissey, B.C., 18 ft. seam.
No. 45. Coal Creek, B.C., 6 and 8 ft. seam.
No. 46. Coal Creek, B.C., 9 ft. seam.
No. 47. Michel, B.C., No. 3 mine—highest seam worked.
No. 48. Coal Creek, B.C., mine No. 3.
No. 49. Morrissey, B.C., 18 ft. seam.
No. 50. Cascade River, exposure between Bankhead and Anthracite.

REMARKS ON SOME RECENT EXPLOSIONS IN COAL MINES.

(Address of President C. J. Coll, Mining Society of Nova Scotia, 25th March, 1908.)

It is not my purpose to go into this subject except as briefly as possible. The causes and effects would furnish material for innumerable papers. We are all, however, interested as to ways and means for the prevention of loss of life and for the protection of property. I shall therefore confine myself to some remarks which in my opinion will make for a lessening of mine explosions.

It would be absurd to contend that any rules or regulations could be framed to absolutely prevent mine accidents. It is an old and trite saying that so long as there are mines there will be mine accidents—so much depends on labor, and, indeed, too often the same applies to officials. Lack of knowledge of the most fundamental principles pertaining to safety, wilful neglect of rules and instructions tend toward increasing the hazards of mining.

The appalling explosions that have occurred in the bituminous mines of Alabama, West Virginia and Pennsylvania, where about seven hundred lives were lost, have started vigorous discussions by technical and trade papers, as well as the press generally, state and mine officials, operators and employees, as to the best means for the prevention, as far as possible, of a recurrence of such disasters. Many suggestions have been made, covering enactments of more stringent laws, closer inspection under such enactments as are now in force, and a healtier cooperation on the part of mine owners as regards discipline and the carrying out of mines' regulations.

It would seem that many of our laws relating to mines and mining are cumbersome, and admit of varied interpretations. All such laws should be as simple as possible, inasmuch as many officials who have intimately to deal with questions arising as to interpretations in connection with the carrying out of mine laws are not familiar with legal phraseology, and err at time through a misconception of what is intended, and not by wilful neglect of certain provisions.

It has been suggested in the United States that a general law be enacted by the Federal Government for the protection of life and property throughout the entire country. There has also been some such measure proposed for Canada. I do not think such laws would be as effective as state or provincial regulations. It is beyond contravention that conditions in coal mining are of such a varied character that it would be practically impossible to frame legislation to meet them. The re-

sponsibility for the enforcement of any such general law rests with local authorities, and depends almost entirely on reports of inspectors familiar with conditions in their respective districts. Such being the case, the details of inspection and enforcement of legislation should remain in control of state and provincial governments. In order to carry this out effectively all laws connected with mining should emanate from states and provinces.

No matter how rigid legislation may be, in order to obtain results aimed at, inspection and enforcement should be in keeping. No evasions should be permitted, except so far as they are at times necessary in order to improve dangerous conditions. The laws should apply alike to each and every mine. Operators anxious and willing to not only meet rigid requirements but to go beyond them in an endeavor to reduce to a minimum causes of accidents should not be made the willing horse to bear the burden of unreasonable demands on the part of constituted authorities, while at the same time competitive mines, from a market standpoint, are permitted to carry on operations in a slipshod and careless manner. I am glad to say the Mines' Regulation Act of Nova Scotia is an admirable one, and affords ample means for the correction of dangerous practices where they arise. Much, no doubt, is left to the discretion of the officers whose duties are to see that its provisions are properly carried out; but with strict, conscientious, discriminating officials, little trouble need be experienced. Added to this, however, workmen and operators should at all times give their hearty co-operation. Let us briefly consider some of the causes of the recent explosions which have occurred.

Yolande-Alabama.

To sum up a report made for the Governor of the State, two members of a commission were of the opinion that gas was ignited by an open light, and on account of the dry, dusty condition of the mine the flame was extended to the other workings. The other member of the commission was of the opinion that a charge of dynamite which a miner was handling exploded, and this, in connection with coal dust, caused the explosion. We may conclude that open lights, coal dust, non-flameless powder and probably firedamp caused the explosion.

Monongah-West Virginia.

The investigation into the causes of this calamity were very thorough and probably received more attention than any which have occurred on this continent. From all evidence adduced and from the reports published the ventilation of this mine was very good. On the other hand, it is known that firedamp was generated, whether in negligible quantities or not there seems to be some question. Gas, however, was reported the morning of the explosion. The mine was very dry and dusty; black powder was used as an explosive; electric chain undercutting machines were in use, and this type of machine grinds the cuttings into extremely fine dust, and by reason of their low cut require a much larger charge of powder to blow down the coal. There was also evidence that fast shooting, at least to some extent, had been in practice. There seems to be some divergence of opinion as to the cause, being variously ascribed to open lights, which were in use throughout the mine, igniting firedamp; a blown-out shot flaming into an explosive mixture of dust; short circuiting of electric wires, and a runaway trip raising an unusual volume of dust, which was in turn ignited by an open light. Here again we have the same elements as at Yolande—dry, dusty mine, with at least some firedamp, in which open lights, non-flameless powder and electricity in addition were in use.

Naomi-Pennsylvania.

It would practically be reiteration of what has been said as regards Monogah to state the probable causes of this disaster, with two exceptions—this mine was more gaseous and ventilation was not deemed adequate.

Darr.

This, the greatest mine disaster in the history of coal mining in the State of Pennsylvania, following closely that at Monongah, was also a matter of much investigation. The report of a special commission appointed by the Chief of the Department of Mines of Pennsylvania is to the effect that this was a gaseous mine. The system of ventilation and electric undercutting chain machines were condemned. These machines undercut to a depth of six feet, with a height of cut of about four inches. This mine was partly very dusty and partly damp. Open lights and black powder were used throughout.

To sum up for all these explosions, we have, for our consideration, two or more of the following dangerous elements—open lights, electric mining machines, explosives, coal dust and firedamp. Let us take these in the order in which they have been named, and treat them briefly in the relations they bear to each other, and from the standpoint of mine owners or managers desirous of protecting life regardless of cost and preventing loss of property, which is coincident with and invariably a resultant of a mine disaster. Not the least of the troubles which follow is absolute disorganization of operating force, through fear of a recurrence or superstition, whereby output is so affected that even if the mine has not sustained serious damage (which is not often the case) it is difficult to bring the mine up to a profitable basis for some time.

Open Lights.

While a strong advocate of locked safety lamps, I would not go so far as to say that there are not mines where open lights may be used without danger. Where a condition exists such as a seam of coal having a light uniform cover, where breaks readily and quickly reach the surface, and little dust and no gas are to be found, I would not hesitate to use open lights. On the other hand, where coal is blown by any explosive, I would certainly use safety lamps.

Again, it would be folly to have safety lamps and use a non-flameless powder. Where firedamp is being generated in a coal seam or is likely to come from overlying or underlying strata, no open lights should be permitted. In the case of firedamp existing in porous overlying strata, it usually follows that where a fall takes place in drawing pillars or in longwall work firedamp will follow the fall. If open lights are in use there is every likelihood of contact with workmen's lights, at or near the face of the workings—indeed I have seen large sections of mines fouled in this way many times. It is my opinion that only under the most favorable circumstances (rarely to be met with in coal mines) should open lights be used, and under no conditions should open and closed lights be used in the same mine. While on the subject, I may be pardoned if I digress to say that many of the objections raised by workmen against safety lamps are not warranted. It has been said that accidents from falls of roof and coal are less with open lights. This I do not admit, inasmuch as dangers of the sort are rarely visible to the eye. The ordinary practice (one of the first

things a man learns in a mine) is to test for such dangers by sounding. To do this, light is of no avail. As regards light required for actual mining, approved modern safety lamps furnish ample for all practical purposes. As a matter of fact, the only persons whose amount of work accomplished is cut down are shift men, who are not on a contract basis: so that to my mind the only sufferers by reason of curtailment of returns is the operator. From a sanitary standpoint there is no comparison.

Electric Mining Machinery.

Generally speaking, I would not use electricity in any dusty, gaseous mine for any purpose, except as introduced at a low voltage, and then only when confined to intake currents. I do not think it safe practice to use electric machines at a working face except under the most favorable conditions—no gas and wet coal—nor would I consider the use of motors on main haulage roads under above conditions, except in an intake current and where saturation of dust was complete—bottom, sides and roof. The machines of the chain undercutting type have been strongly condemned in various reports made on the accidents subject of these remarks. What the outcome of certain recommendations will be is matter of interest.

Explosives.

Probably no question in connection with coal mining in recent years has attracted more or wider spread attention than this—both before and after the explosions under discussion. More especially is this true in Great Britain and on the continent, where many commissions have been appointed to make careful examinations of powders for coal mines. As a result of such commissions, legislation has been enacted whereby only such powders may be used as have passed the most rigid tests and come under the head of permitted explosives, and named for specific conditions and purposes. It is within the scope of this paper to touch but briefly on this subject. It is not claimed by the manufacturers of so-called flameless powders, nor if so claimed would it be admitted by practical mining men, that under any and all conditions such powders are "safe." The question that confronts us is that for economic reasons we are obliged to use some explosive to blow down coal. This being the case, what explosive shall be used? Certainly not those which on every hand (from past experience) have been condemned. I would therefore not consider the use of any other than a so-called flameless powder. Even with this there are dangers well known to the officials and workmen who are in daily contact with its use. It is needless to say that it should never be fired in the presence of gas, nor should it be used for fast shooting, especially in a dry, dusty mine. It is a well known fact that a shot well placed and exerting its maximum amount of energy in material won is least dangerous: hence the danger of blown-out shots.

Again, it is well known that even the best of the flameless powders will not explode, but burn in the hole. Taking into consideration the proportion of coal which may only be won economically by shooting, it remains for the mine manager of to-day to use the explosive least liable to cause such disasters as have taken place within the past five months, as I am of the opinion that nearly all of them were directly due to the use of so-called non-flameless explosives in the presence of other elements of danger. The essentials of shooting to reduce as far as possible every chance for disastrous results are comprised within certain precautions:—

First—The working face to be shot should be properly mined and sheared (if a close cut) to permit of the greatest effective energy of the charge being consumed in the breaking down of the coal.

Second—Holes should be so drilled as to bring maximum results from a minimum charge. This is a matter of education, as it will usually be found that there are miners or officials who make a close study of this question. Returns will show day in and day out that certain men will put out more coal per given quantity of powder than others. Their method of holing and charging should be the basis for like conditions.

Third—No fast shooting should be allowed under any circumstances or condition. I feel sure this position is subject to attack both by operators and workmen. A detailed defence of this declaration would of necessity be a paper in itself. I will therefore confine myself to a simple assertion that there are more dangers connected with fast shooting due to the possibility of blown-out shots than with all other troubles combined incident to the use of explosives. This has been recognized in some districts, and is a matter of legal regulation.

I offer for your consideration the rules governing shooting which have recently been put into practice in the mines of the Acadia Coal Company:—

1. When a miner holding a shot firer's certificate is given permission to fire his own shots, before firing he must carefully examine the place where the shot is to be fired, and if he discovers any noxious gases, defects in the roof, or danger from any other source, no shots must be fired until such danger is removed.

2. No shot must be fired until the face is either sheared, mined or undercut, not less than three feet deep, the full size of the place, or having an open end equal to the same, without special permission.

3. No shot must be fired, when the borehole used for firing extends beyond such mining, shearing, undercutting or open end. All holes found beyond such mining, shearing or open end will be termed fast shots.

4. No shot must be fired with the timbering at a greater distance from the working face than eight feet, or closer if required by the management, or by a special permit that timbering may be a greater distance from the working face.

5. He must return immediately to each shot after it fires, and if he should find that the shot has lighted a blower of gas, liberated a quantity of gas or disturbed the roof or timber and caused danger beyond his control, to either extinguish, repair or make safe, he shall immediately notify some official at the time in charge of the mine or district in which he is working.

6. When a "bench" shot has been fired ,the miner must immediately proceed to turn over the coal or load it out.

7. If the shot fails to go off, no person shall be permitted to enter to the working face, until such time as he receives permission from and is accompanied by the examiner of that section.

8. No holes shall be charged for a longer period than 30 minutes before being fired.

9. If, owing to an insufficient charge of powder, a face shall be "hung up," all the coal to the depth of that shot must be mined out by hand pick or machine, unless permission is given by the examiner of that section to drill and fire another shot.

10. No miner or shot firer shall leave any charged hole in his working face, when quitting work for the day.

11. No person shall drill any hole in such manner that when fired it will be liable to shoot into either roof or bottom of the coal seam.

12. If a miner, at any time before or after firing a shot finds that any timber requires to be set or replaced, he must not leave the place until such requirements are duly executed.

13. He shall also set sufficient holing props when required to do so, and to work his place in a safe and proper manner.

14. In firing shots with a battery, the wires shall be first connected to the fuse wire, and the connection to the battery shall be made only by the person who has made the connection to the fuse wire.

15. Every precaution must be taken to ensure each person being in a safe place before any shot shall be connected up to a battery.

16. No battery shall be tested or tried at any point outside of the lamp station.

17. No batteries shall be permitted to be used by any other than one holding shot firer's papers.

18. No person shall be permitted to fire shots without permission from the examiner or official in charge of the mine.

By special order another rule has since been put into effect, namely, that all holes must be stemmed with clay. It will be noted no mention is made of stemming bars or needles, as the Mines' Regulation Act of Nova Scotia provides that none other than copper tipped or wood be used.

No person other than a regularly appointed official shot firer should be permitted to fire a shot. It should be his duty to examine every place before shooting, and also to see that holes are properly placed and drilled, and to make a study of the amount of charge required under any condition which may arise. It should also be his duty to instruct unskilled labor in their duties and warn them of dangerous conditions.

There are two bugaboos facing operators in changes (so far as operators are concerned in their relation to labor), namely, from open to closed lights and in explosives. The antagonism to such changes on the part of workmen is largely one of sentiment. I do not hesitate to say that when better and safer means are adopted for the preservation of life and protection of property, and when workmen become familiar with such means, they would object as strenuously if the old customs and practices were restored.

Coal Dust.

This menace to all coal mining has probably been the cause of more heated discussion for and against its explosiveness than any condition connected with mining. From the days of Faraday and Lyell until the present time this question has been a matter of dispute. That it will augment the force of an explosion of firedamp from any cause is, however, recognized by practically all mining men. It is also generally admitted that so-called negligible percentages of gas and coal dust may, under certain conditions and mixtures, become explosive as a mixture. The careful mining man should not be led into splitting hairs in any matter wherein there is the barest possibility of danger. Such questions had best be left for discussion to persons whose interests are not of a financial nature in mines or mining. Fewer accidents will happen if the gun is always treated as being loaded.

The theories advanced that in itself (coal dust) more danger is to be apprehended in winter than in summer, in intake airways than in returns, in high air velocities than in low should receive no consideration from mine managers whose duty it is to keep a mine up to its highest effective point, which precludes the possibility of accident, where accepted measures of practice, if employed, would avert them. The only known effective and practical solution of overcoming the difficulty of dust is humidity.

The simplest and no doubt the best plan is by sprinkling. Obviously the more nearly this approaches saturation the better. At this juncture, I wish to lay particular stress on thoroughly wetting floor, sides and roof. Especially is this necesary in main haulage-ways used as an intake, for the reason that explosive forces invariably travel against the current of fresh air, and it is also true that such explosive forces have spent or been greatly reduced when such an airway or district has been reached when coming from inbye, the usual source of an explosion. It has been suggested that a small proportion of lime added to water will reduce the combustibility of dust materially. Humidity may also be greatly increased by means of sprays in the intakes. This is readily accomplished in deep mines where a head of water may be obtained from discharge columns. From there, small lines may be run to intakes. By small perforations in coils air may be thoroughly saturated. While much of the moisture would no doubt be precipitated within a short distance, enough would remain in suspension to overcome the difference in humidity as between summer and winter. In other words, it would be uniform the year round.

Firedamp.

Little need be said about this, for, like the poor and taxes, we have it with us always. Well regulated and distributed ventilation is the only remedy. Constant vigilance, frequent inspection and rigid discipline are absolutely necessary in order to prevent accidents. In my opinion the barometer should be carefully considered as a means of warning. Treated as such, it will induce extra precautions and watchfulness during periods of atmospheric disturbance. It may be of interest to the members to know that it was remarked by the officials of the Acadia Coal Company that during the latter part of the year 1907 there were frequent and violent fluctuations of the barometer recorded. It was during this time the explosions under discussion occurred.

In conclusion, I would recommend as follows:—

First—Frame simple, effective, stringent laws to cover local conditions.

Second—Operators obey the laws. When it is known that no evasions on their part are countenanced or contemplated, workmen will be more amenable to discipline.

Third—Court the closest inspection under the laws and take suggestions even beyond the laws which make for the betterment of conditions.

Fourth—Exercise strict discipline with workmen, and educate ignorant or unskilled labor to meet dangerous conditions.

Fifth—Use none other than approved safety lamps where firedamp or dust are likely to occur.

Sixth—Abolish electric mining machines in dry, gaseous mines.

Seventh—Prohibit the use of all explosives except non-flameless ones.

Eighth—Permit no fast shooting.

Ninth—Prohibit the use of coal dust for tamping.

Tenth—Supervision as to placing of holes and amount of charge.

Eleventh—Employ regularly appointed competent shot firers to fire all shots.

Twelfth—Allay coal dust as much as possible by sprinkling or other means.

Thirteenth—Remove all coal dust after machines before firing shots.

Fourteenth.—Have adequate ventilation and regulate to meet conditions.

Fifteenth—Employ competent, conscientious officials, and see that all parts of the mine are visited at frequent itnervals.

If such regulations had been carried out in the spirit as well as to the letter, the appalling calamities which have been the subject of this paper would not have occurred.

BOOK REVIEWS.

THE COPPER HANBOOK—A MANUAL OF THE COPPER INDUSTRY OF THE WORLD. VOLUME VII. COMPILED AND PUBLISHED BY HORACE J. STEVENS, HOUGHTON, MICH. U. S. A.

Volume VII, of the new edition of the Copper Handbook, has just been issued by the author, Horace J. Stevens, of Houghton, Michigan.. The book has 1228 pages, octavo, brevier type, being materially larger than before. The author apologizes for his inability to revise the book throughout, explaining the fire, sickness and loss of five months time prevented. However the new volume contains about 180,000 words of new matter, equal in length to three ordinary works of fiction, in addition to the matter remaining unchanged from the preceding issue.

The new edition of the Copper Handbook contains 25 chapters, an increase of nine, treating of copper under the headings of history, geology, chemistry, mineralogy, mining, milling, concentrating, hydrometallurgy, pyrometallurgy, electrometallurgy, alloys, brands, grades uses, substitutes, terminology, geography, copper deposits, copper mines and statistics. The treatment given the subject in 1228 pages is encyclopaedic in scope, but the logical and orderly arrangement of the great mass of facts presented, coupled with a table of contents, full index and alphabetical arrangement of districts, countries, mines, minerals and glossary, renders it possible to ascertain any given fact with almost as much ease as a word is found in the dictionary. This is a point of much value to readers that has been overlooked in many otherwise excellent works of reference.

The Copper Handbook is not intended to replace other works for the use of technical men, but it does supplement all other technical books on copper, while for the average reader its hundreds of pages devoted to the scientific and technical features of the subject will be found to cover every point of interest. The language is plain throughout, and the layman, whether miner or investor, will find the clear and easily understandable exposition of scientific facts a great aid, as the highly technical language used in many of the best scientific works is a serious stumbling block in the path of the man not technically trained.

In whatever light the Copper Handbook is viewed, whether in describing the thousands of different copper mines, in all parts of the world, in the plain descriptions of intricate processes of mining, milling, smelting and refining, or in the forty pages of statistics covering the copper industry of the globe in its various commercial and financial aspects, the book must stand as a monument of patience and labour, since it is the unaided work of a single man.

The descriptions of the mines are written without fear or favor, and several hundred mining companies, some very prominent, are handled without gloves, and in a manner that would justify no end of libel suits were the author not sure of the facts. In view of the exceedingly plain speaking in this book, in which scores of companies are termed swindles and frauds, it seems rather surprising that in the seven years of its publication not one libel suit has been brought into court, though many have been threatened. In fact the author of the Copper Handbook has turned the tables on some of his critics by placing a few of them in prison, for their frauds upon the investing public.

The price of the Copper Handbook is five dollars, and the selling plan used is absolutely unique in the book trade. For five years past Mr. Stevens has sent his book, all carriage charges prepaid, without a penny payment in advance, to any person in any part of the world, on one week's approval, subject to return if unsatisfactory. It speaks well for the book that only about one copy in thirty has been returned, and well for the honesty of average human nature that only about one man in thirty keeping the book has failed to pay for it. On these unusual terms anyone interested in copper can well afford to send to Mr. Stevens for a copy of the new edition of the Copper Handbook.

SIMPLE MINE ACCOUNTING—BY DAVID WALLACE, EXPERT MINE ACCOUNTANT. HILL PUBLISHING COMPANY, 505 PEARL STREET, NEW YORK. 9 1-2 x 6. PP. 63. PRICE, $1.

There are very few subjects upon which a hand-book is so badly needed as on mine accounting. As a branch of bookkeeping it receives little attention in the ordinary business college. So true is this that almost invariably the mine accountant is forced to invent a system of his own after he has gone through the inevitable period of mistakes and waste.

It will therefore be conceded that the book before us is timely. It is intended primarily for those who have had no opportunity to study bookkeeping. It is also intended to be of use to mine accountants and bookkeepers. These aims are praiseworthy.

We believe, however, that the book will be of more assistance to the trained bookkeeper than to the superintendents, mine foremen, and others for whose benefit it was largely designed. It is doubtful if an inexperienced man could follow the somewhat intricate methods presented by Mr. Wallace.

All the forms given are good, although Form No. 20 page 50, is complicated and not particularly necessary. Incidently the phrase "Waste" is used without explanation. In Form 15, bracketted figures are used to indicate the distribution of items to accounts. The explanation of these figures is not given until the next chapter.

A series of footnotes would have made the forms more easily intelligible.

These are, after all, incidental faults. It is probable that there will be a large demand for the book. Experience will show exactly in what respects it needs alteration.

CANADA'S FERTILE NORTHLAND—EDITED BY CAPTAIN ERNEST J. CHAMBERS, GENTLEMAN USHER OF THE BLACK ROD. PUBLISHED UNDER DIRECTION OF R. E. YOUNG, D. L. S., SUPERINTENDENT OF RAILWAY LANDS, DEPARTMENT INTERIOR. GOVERNMENT PRINTING BUREAU, OTTAWA, 1907.

The evidence heard before a select committee of the Senate of Canada during the Parliamentary Session of 1906-7 is here condensed and collected.

The report deals with the mineral, agricultural, timber and fishery resources of those parts of the new provinces of Saskatchewan and Alberta that lie north of the Saskatchewan watershed, of Ungava, of Keewatin, and of Mackenzie, which lies north of Saskatchewan and Alberta.. The total area of these districts is 1,637,559 square miles or more by 300,000 square miles than twice the combined area of the four original provinces of Confederation.

Dr. A. P. Low, Mr. R. G. McConnell, Mr. J. B. Tyrrell and Mr. D. B. Dowling are among those who gave evidence upon mineral possibilities and transportation in the region west of Hudson Bay.

The navigability of Hudson Bay is touched upon and valuable meteorological tables are included.

The pamphlet is timely, especially in view of present and proposed railway extension.

EXCHANGES.

The Mining World, March 21, 1908—The system of government inspection of mining claims in Ontario is the subject of a short paper in this number of the Mining World. Mr. J. B. Tyrrell of Toronto is the author. He gives an illustration from real life of the practical working of Ontario mining law.

Last summer Mr. Tyrrell was professionally engaged by a prospecting syndicate to inspect claims staked out in the vicinity of Montreal river. He had, of course, no interest whatever in the properties, but inadventently some of the claims were, by power of attorney, staked in his name. Two claims, A and B, were staked and worked alternately by a small gang of men. Word was received that claim A would be inspected on August 1st. The foreman waited for two or three days, but the inspector did not appear. The foreman was then called to a distant claim and in his absence the government inspector arrived. About a month after this, word was received that the claim was thrown open and notice to that effect was posted in the recording office. Those visiting the office had, naturally, the first information and a rush was made to restake the claim,

It was first restaked by J.— at some distance from the original discovery. A government inspector immediately passed the discovery and J.— was given the claim.

Later in the summer claim B passed inspection in favour of the syndicate on a native silver discovery.

Mr. Tyrrell concludes by stating that it would be difficult to conceive any plan more effectively discouraging to investors than this arbitrary criticism by government officials. He suggests that the government should be entirely grateful to any man who is putting his money into the development of mining claims.

The *Engineering Magazine*, April, 1908—The leading article in this number is "Rescue Appliances in the Mines of France." The author, M. Jacques Boyer, is a French consulting mining engineer.

After the Courrieres catastrophe a commission of four selected engineers was appointed to enquire into the merits of respiratory apparatus. The commission report led to the issuance of a decree (April 15, 1907.) directing that mining in France should provide, for all workings when more than 100 men are employed, "portable respiratory apparatus ready for immediate use and permitting the wearer to remain at least one hour in an irrespirable atmosphere." This and other requirements were to be fulfilled within one year of the date of the decree.

Rescue appliances date back to 1785, according to an official memorandum issued in 1824 by the French Government, describing three types of apparatus and requesting mining companies to procure a number for rescue work. The first apparatus described was a French invention and consisted of a nose clip, a mouth piece, and a respiratory tube for free air. To it were subsequently added an anti-memphitic respirator with two valves, and a lamp supplied with air through a branch of the respiratory tube. The second apparatus included air reservoirs carried in a rescue car. To the reservoirs respiratory tubes were attached. The use of compressed air was suggested. The other suggestion was the use of respiratory tubes supplied by blowers and suitable piping.

This memorandum was disregarded and it was not until 1864 that progress was marked by the appearance of the Galibert respirator, a reservoir of pure air carried upon the miner's back, a respiratory tube from the bottom and an exhalatory tube from the top, both connected with the mouth. The ivory mouth-piece had two orifices and by closing these alternatively with the tongue he inhaled air from the bottom and exhaled it from the top. A man could use this apparatus for fifteen or twenty minutes, but the air became greatly vitiated. Later, Galibert attached a device for absorbing the carbonic acid gas and partly regenerating the air.

Rouquairol-Dinayronze in 1870 brought out his *aerophore*, consisting of a large sheet-steel tank containing air compressed to 20 atmospheres. A pressure regulator was attached and the nostrils of the user were closed by the pince-nez.

In 1884, Dr. Regnard applied the principle of revivification of the air by means of a reservoir of oxygen and of the passage of the exhaled air into another receptable filled with pumice-stone saturated with a solution of caustic potash.

Up until 1880 no apparatus was devised that could pass satisfactory practical tests. But in 1903 Lieutenant Vanginot of the Paris Fire Department invented, and in 1907 improved, a respirator that has been used in many places with success.

The two types of rescue apparatus in use in French mines are:—

1. Portable appliances which permit the bearers to move at will.

2. Apparatus with pumps and piping, having a limited range of action and adapted rather for work than for rescue.

The portable appliances may be divided into two classes: First, regenerative apparatus, and, second, apparatus using ordinary air.

In the former class may be noted the ancient *pneumatophores* (used more commonly in Germany and Austria than in France), which consist of oxygen tanks, usually without any regulator, delivering into an air-tight bag from which the man inhales and into which he exhales. An absorbent in the reservoir purifies the exhaled air by the removal of the carbonic acid gas. This type has been abandoned as has also the Shamrock.

The Draeger-Guglielminette respirator is complicated and its parts are fragile. It comprises an oxygen reservoir, a pressure reducing regulator, a respiratory mask, and a regenerator. The oxygen tank consists of one or two steel reservoirs holding one litre each and containing oxygen at 110 atmospheres. The exhausted flasks may be replaced with full ones or may be refilled in place. The newer forms of the apparatus permit the exhaled air still containing oxygen to pass two or three times to the lungs. The apparatus, though ingenious, is most complicated and is little employed in French mines.

The *pneumatogene* of M. M. Bamberger and Friedrich Bock is also a regenerative appliance. It is based upon the reactions that take place when the products of respiration are passed over the peroxide of sodium and potassium.

The early types permitted only 30 to 35 minutes stay in an irrespirable atmosphere; later types may be used for two and one half hours. They are generally used in Austria, but very little in France.

The Tissot respirator, invented in 1907 is one of the best conceived French apparatus of the type. Its five essential parts are:—

1. A nose-piece with valve, adjusted to the nostrils of the wearer by means of two nipples fixed on the tube, and attached firmly to a round cap by means of straps. A potash regenerator removes the carbonic acid; and the regenerated air passes to the reservoir bag.

2. A regenerator fixed on the case, which serves also for the protection of the gas bag.

3. A reservoir sack for the air, in which the regenerated products of repiration are accumulated.

4. An automatic safety or escape valve of the slide type, operated by the walls of this air reservoir.

5. A receiver for compressed oxygen provided with a reducer and a gauge by which a constant flow of oxygen is obtained and is regulated at will by the wearer.

The time limit of the Tissot respirator is three and a half hours. Since the apparatus is borne upon the chest the wearer may crawl upon his stomach without hindrance.

The Vaginot apparatus consists of three parts:

1. A battery of air accumulators.
2. An indicating reducing gauge.
3. A respiratory mask or helmet.

In construction it is simple, being put into operation by merely opening a stop-cock. A special arrangement permits the wearer to travel any distance without using the air supply stored in the battery. Another warns the operator when he has but fifteen or twenty minutes supply left. With a sufficient supply of reserve compressed air accumulators the rescue party may remain at work indefinitely. The apparatus is carried on the back.

The aerolith, or liquid-air respirator, on account of the costliness of liquid-air, is rarely employed.

PERSONAL AND GENERAL.

Mr. F. P. Jones is visiting various steel plants in the States.

Mr. H. E. T. Haultain is paying a professionl visit to Cobalt.

Dr. A. B. Willmott passed through Toronto on the 7th inst. on his way to Cobalt.

Mr. Charles D. Warren of Toronto has been elected president of the Lake Superior Corporation.

Mr. George Stairs, of Halifax, N. S., whose death occured suddenly last week, was a director of the Nova Scotia Steel Company.

Mr. J. H. Plummer, president of the Dominion Steel Company, arrived in New York on April 1st after a protracted visit to England.

Mr. Philip E. Clinton, a representative of the Guggenhiem interests was in Montreal recently investigating some Canadian mining propositions.

Prof. James W. Hayward, assistant professor of mechanical engineering at McGill University, Montreal, has resigned his position to devote himself to outside engineering work.

Dr. James Douglas, of New York, also is a graduate of Queens' University, Kingston, Ontario, has subscribed $10,000 towards the endowment fund of the School of Mining affiliated with the University.

Mr. G. Becker, Vice-President of the Northern Dredging Company of Chicago, which has a 15 mile gold dredging concession on Saskatchewan river near Edmonton, has arrived here to direct operations on the opening of the season.

A Fort William, Ontario, syndicate have secured 61 iron mining claims in a locality about 100 miles west of that city on the main line of the Canadian Pacific Railway. Test pit indicate that there is an extensive deposit of valuable iron ore.

Mr. R. Watson, an experienced mining man also has been associated with Mr. Wm. B. Thompson, of New York, in various enterprises has been elected general manager of the Nipissing Mining Company, in place of Mr. T. R. Drummond, resigned.

Mr. J. C. Dufresne, who lately resigned the position of mill-superintendent of the Bluebell mine near Kaslo, British Columbia, was presented with a gold watch by the employees of the Canada Metal Company. Mrs Dufresne, at the same time, was given a pendant.

Mr. Frank C. Loring, of Toronto, who is at present in London, England, was recently interviewed by a representative of "Canada." In his replies to interrogations Mr. Loring alludes to the elimination of "wild-cats" from Cobalt. He also speaks confidently of the future of the camp; especially when custom smelting rates have been adjusted to a sound commercial basis.

SPECIAL CORRESPONDENCE

Nova Scotia.

Glace Bay.

The weather during March has been of the mildest character and the supply of labour at the collieries more plentiful than for some time past. The result of this favourable combination is shown by the outputs, which exceed anything yet attained in the month of March. The outputs of the Dominion Coal Company's mines for the month of March in the last five years has been as follows:

1904	232,245
1905	228,765
1906	310,220
1907	212,831
1908	346,529

Compared with the first three months of 1907, the 1908 outputs so far show a gain of well over a quarter of a million tons, and it is expected if all goes well that by the end of the year the gain will amount to over 400,000 tons, and that the year's output for 1908 will be within 100,000 tons of 4,000,000 tons. As the entire Canadian coal output is between eight and nine million tons it will be seen how large a proportion of this comes from Cape Breton, when the outputs of the remaining island operators are added.

It is anticipated that shipments to the St. Lawrence will commence at the end of this week, or about the 5th of April. If this can be done the shipping season will commence practically six weeks earlier than in 1907, and unless some unforeseen hindrance takes place the St. Lawrence shipments this season will exceed any previous performances. The Dominion Coal Company have chartered a fine fleet of coal carriers, all of them self-trimmers and averaging between 6,500 and 7,000 tons cargo capacity. These boats are new and fast and it is hoped to make weekly round trips with them. Things were never in better shape for the shipping season's work than at present, and with all labour disputes satisfactorily adjusted we are confidently looking forward to an excellent showing for 1908.

The statement made by Mr. James Ross at the Annual General Meeting of the Dominion Coal Company in Montreal on the 5th of March has been printed in pamphlet form and distributed to the shareholders of the company. It has excited general interest in Nova Scotia and has created almost a revulsion of public opinion in favour of the Coal Company's contentions. The general sentiment of Nova Scotia has been up till now very strongly in favour of the Steel Company, but this sentiment or atmosphere one might term it, so all pervading was it last summer, was based very largely upon an industriously cultivated impression grounded on superficial facts that the Steel Company was the under dog and was being mercilessly worried by the Coal Company. This illusion has been dispelled by Mr. Ross's statement, which is a masterpiece of lucidity, coldly marshalling an array of damnatory facts that put the arbitrary actions of the Steel Company in a very poor light. In the light of events during the past three months it is difficult to understand the actions of the Steel Company, unless they were deliberately intended to embarrass the Coal Company. In the spring of 1906, the Steel Company, broke their promise under the *modus vivendi*, that they would make a bank. This year, fearing a strike of the Coal Company's miners, the Steel Company have managed to gather a bank of over 50,000 tons. The whole trouble between the Steel Company and the Coal Company in 1906 arose from the Steel Company's refusal to provide a bank in the spring months when labour was plentiful and the Coal Company's outlet restricted, coupled with the Steel Company's abrupt refusal to accept slack coal and their demand for run of mine at the very climax of the St. Lawrence season, that season by the way one that had been beset with most unusual difficulties. We may quote Mr. Ross here: "The Steel Company's course of action appeared to your directors to be wholly unreasonable. The slack, which it refused, it had been taking for a year, and had volunteered the statement that it was satisfactory. The run of mine, which it insisted on, it had to crush to the same size as the slack before it could use it. The Coal Company had slack, but could only get run of mine with great difficulty. The time chosen was the one at which such action would most embarrass your company. There was no advantage to the Steel Company to justify its action. There was, however, the possibility that such action taken at such time would embarrass your company that it might fail to deliver quantities and the Steel Company could then have closed its works at your risk and dictated terms." After summing up his position, Mr. Ross remarks: "I feel I hardly need to ask any of you what you would do under similar circumstances" and we think the most peacably minded of men might very well have made the same remark in similar circumstances. What other action the President of the Coal Company could have taken without betraying his company's shareholders it would be hard to say.

Remarkably good progress is being made at the new collieries of the Dominion Coal Company at Victoria. The building of 50 houses with a boarding hotel and a manager's house has been commenced and will be rapidly pushed. It would be difficult to find a more ideal location for a colliery than that of No. 12. The neighboring colliery is to be called No. 14. Even the Coal Company makes concessions to a superstition, and we suppose their so doing has a very real financial basis. Miners are a superstitious race. We have known many a man turn back from his work in the early morning because he met that harmless and necessary creation—a woman! However, that was not in Cape Breton.

The report of the Department of Mines of Nova Scotia ending 30th September 1907 is to hand, and is an interesting publication. There are few innovations over previous reports, but as yet the newly appointed Commissioner of Mines has not had time to make any very radical improvements. We prophesy that the report for 1908 will be a much fuller and better arranged publication than the one now before us. In the summarized figures on the first page we notice several items that do not appear in the 1906 column. One is building stone. It has often been a source of wonder to us that we have not more buildings in Nova Scotia of native stone. In Cape Breton alone we have a remarkable assortment of valuable and durable building stones. We have granite, marble of most excellent quality it is said, porphyry and syenite, limestone, sandstone, etc. The quarrying industry is one that is bound to grow as the forests become more and more depleted, and as the cities of the Dominion increase in wealth and dignity.

There are a number of spelling mistakes especially in proper and proprietory names which need revision. We notice "Janesville for Jeanesville, "Muesselar" for Meuseler" and several similar slips. An interesting feature of the Deputy Inspectors reports is the growth of the use of safety explosives in our mines. It would be interesting to have a better classification of accidents, and showing the chief divisions of accidents, such as gas, dust or powder explosions, falls of roof and sides, haulage accidents, etc. Not to be hypercritical it seems to us that an official report is hardly the place for personal enconiums even for "young men of natural ability and good training." Such remarks rather detract from the dignity that should attach the report of an Inspector of Mines. We must say the reports of the inspectors make good and interesting reading, and we think the report should be given a wide distribution among the colliery managers and underground officials. The photographs illustrating the report will materially increase its value as an advertisement of the provinces mineral resources, for which purpose we take it they were introduced. We notice also the flow sheet of the Dominion

Antimony Mine at West Gore. Specific information of this kind is very valuabe. Altogether we think the department is to be congratulated on its 1907 report and as we said before we shall be surprised if the 1908 volume is not an improvement on any of its predecessors.

Ontario.

Cobalt.

Nipissing.—Mr. T. R. Drummond, the manager, leaves on the 20th of this month for Utah, his resignation having been accepted. He will take charge of some properties there for some men who are also heavily interested in Nipissing. He will be succeeded here by Mr. R. B. Watson, late consulting engineer for the Shannon Copper Company of Arizona. Mr. Watson is also a director of the Nipissing. The annual meeting of the stockholders of the Nipissing Mines Company will be held on April 20th. The number of shareholders in Canada and the United States has nearly doubled within the last year. There are now 14,000 on the books.

Silver Leaf.—The shaft is down 115 feet. A carload of ore is ready for shipment and will be sent out early next week. This car should run up very well, as rich ore has been taken lately from the shaft.

Rothschild.—Work has been discontinued here for the present and the diamond drill plant moved to the Shamrock, where work will be carried on. This is being done by the Montreal Ventures Syndicate.

City of Cobalt.—A new departure in shipping was made here. Two carloads of low grade ore have been shipped to the smelter at Trail, B.C. A freight and treatment rate of $19.50 was obtained—$12 freight and $7.50 treatment.

Duchess.—A complete mining plant is to be installed here, and no more mining will be done until the installation is completed.

Ferland-Chambers.—Captain Jeffrey, formerly superintendent of La Rose mine, has a crew of men at work. A shaft will be sunk close to the Right of Way workings.

Crown Reserve.—Work has been started on the new shaft, which will be sunk to a depth of 100 feet and a cross-cut run to the vein. A new boiler, hoist and compressor will be installed. This company is capitalized at $2,000,000, of which $1,500,000 had been issued. The stock was selling at 28, when an issue of $250,000 more stock was made. The shares dropped to 6, but are now back at 23. The property is looking very well.

Little Nipissing.—Mr. Madden, the superintendent, has a carload of ore sacked and ready for shipment.

Abitibi Mining Company.—This company are putting in a plant and work will commence at once.

Kerr Lake (Jacobs Mine).—There were 8,600 ounces of metallics in a 30 ton car shipped from here to Copper Cliff this month.

Colonial.—After having been shut down for some months, this mine has started up again, and four drills are being run.

Green-Meehan.—Work is to be resumed here shortly.

Cleveland Cobalt.—Mining on this company's property at Clear Lake has been suspended. The power plant is still running, supplying power to the city of Cobalt mine and also the lighting for the town of Cobalt.

Badger.—The shaft is down 115 feet and ore carrying a quantity of native silver is being taken out.

Coniagas.—The mill is to be enlarged, so that instead of about 55 tons a day being run through as at present, the capacity will be 80 tons. A producer gas plant will be put in. Work is going on well with the new shaft house, which will be completed in the next week or so.

Right of Way.—Connections at the first level, between Nos. 1 and 2 shafts, has been made and the hoisting, etc., will now be all done at the No. 2.

Savage Mine.—Work has been stopped here until a new boiler is put in.

Wetlauffer.—Work has been stopped here until the boiler and hoist are installed.

Casey Cobalt.—This is a new shipper, 40,000 pounds being sent to Glasgow.

The smelter at Deloro, which has been running on ore from this camp, has made a shipment of bullion to England, worth between twenty-five and thirty thousand dollars.

Lorrain Township.

Some of the holders of large interests in the Nipissing have been trying to get hold of the Keeley claim. An offer of $225,000, the owner to keep ore now on dump, was made, but refused. There is $25,000 worth of ore now sacked, all taken from a pit seven feet long and twenty feet deep.

Native silver has been found on the Crawford claim, a mile and a half from here.

The other claims being work are showing up well. The roads in are in bad shape.

Montreal River.

Chas. Gifford has 40 sacks of high grade and as much more low grade ore ready for shipment.

High grade ore carrying native silver is being sacked on a claim in the Township of Smythe.

The White claims on Maple Mt. have been bonded to an English Syndicate for $150,000. Men have been sent in to cut roads and arrange for development.

Larder Lake.

Mr. Hough, the Recorder at Larder City, has brought down some very fine samples of gold-bearing quartz from the dump at the Maxwell-Harris mine. The gold can be seen all through it. Owing to poor fuel, not enough steam could be raised to keep the mill running, but dry wood is now being brought in. If it is found that this property and the Reddick have plenty of ore that can be mined and milled at a profit, it will mean that there will be much more development work going on in that district this summer than there would otherwise have been. From all accounts both these properties have plenty of ore that can be cheaply mined, so it depends upon the values and what can be saved.

The Reddick Company has been re-organized and work will be resumed shortly.

Dr. Beattie Nesbitt, of Toronto, has acquired control of the Barnard claim on Larder Lake.

A find of placer gold has been reported on the Nottingham river up north, and some parties have been sent out to investigate.

British Columbia.

Rossland.

Owing to the increased quantity of gold that is now being carried in Rossland ore the Trail smelter has just been able to send away the richest car of matte that they have ever shipped. The car, which was sent to the Tacoma refinery, was valued at over $32,000, and the matte carried 41 per cent. copper, 35 ounces silver and 45 ounces gold per ton. The Consolidated Mines will increase their shipments about 100 tons per day in the near future, bringing their daily tonnage up to about 550 tons per day. Development in the gold-bearing ore recently uncovered at depth in the Le Roi and Consolidated mines is giving gratifying results. Mining men here seem to consider the discovery of this good ore at depth an indication of the approach to the rich zone which prominent mining engineers have said would eventually be encountered in the lower levels of the camp. Several more South

Belt claims have been leased, including the Nest Egg and Mayflower. The Blue Bird lessees are still working in good ore. It is stated that the Blue Bird Company may buy the lease back and work the property themselves on a larger scale than the lessees are now operating. A large number of the properties that have lain idle will be worked on leases this coming season; while some of them may encounter good ore and continue to work, there is little doubt but the most of the lessees will give the thing up as a hopeless task after they have worked a while without obtaining any results.

Shipments from the camp for the week ended March 28th were:

	Week.	Year.
Centre Star	3,220	42,638
Le Roi	1,960	22,054
Le Roi Two	350	7,928
Evening Star	31	387
California-Giant	....	60
Totals	5,561	73,067

A $30,000 steel furnace is to be added to the smelter equipment at Trail. A number of the old, lapsed claims hereabouts are being re-staked, mostly in a speculative way.

Boundary.

Work is continued at high pressure at the Granby mines and smelter in the Boundary. During the week ended March 21st they shipped 25,388 tons, which was a larger week than any previous one in their history, and then for the week ending March 28th they shipped 27,288 tons, the heaviest shipments in the history of the mine. The totals for the year to date are: 246,796 tons mined and 239,587 tons smelted.

One day recently the company shipped 4,048 tons from its mines in 24 hours. Each of the furnaces have been treating 428 tons daily, which is working them to the very limit of their capacity. The Granby shipments during March touched the 100,000 ton mark, this being the greatest tonnage ever got out of the mine in its history, or, in fact, in the history of any copper mine in Canada. It is hardly expected that April will be as big a month as there are several improvements to be made around the plant which will take up eight or ten days' time. The coke and ore bins at the smelter have been enlarged, making it much easier to handle these products.

Boundary mining men hardly expect now that copper will take any great rise for some time. Owing to the heavy fixed charges at the Granby mines and smelter they deem it advisable and more profitable to work, even with copper at its present low figure, than remain idle. These charges may be the cause of some of the other Boundary companies resuming, if copper remains down for some time. It was rumored in this district last week that the Consolidated Company would absorb the British Columbia Copper & Dominion Copper companies. This report is denied by Mr. Keffer, of the British Columbia Copper Company, who states that his company will start their mines and plant up in their own interest just as soon as the copper values warrant such action. The Granby, Snowshoe, Sally and Crescent are the only mines that have shipped from the Boundary so far this year. A five stamp mill is now being installed at the Golden Zone mine, near Hedley.

The Provincial Government will not permit the City of Greenwood to issue bonds for $50,000 to bonus the tunnel scheme proposed at that point, which places another obstacle in the way of the promoters. Work on the E. P. U. is being carried on by a Greenwood-Phoenix syndicate. The British Columbia Copper Company has placed an order for eight 30 ton slag pots, which will be installed and ready for work when they start up. These pots will weigh eight tons each. The Providence Company has placed $50,000 worth of its 5 per cent. gold bonds. The money derived from the sale of these bonds will be put into development work. Phoenix men have begun development work on a group of five claims which adjoin the Oro Denoro in Summit Camp. The showing at present on these claims warrants a little exploration work.

Nelson.

A delegate from Nelson recently visited the principal towns in Alberta in an effort to get them to aid in the work of obtaining a renewal of the bonus on lead mined in Canada. As a result of his trip the boards of trade of Edmonton, Strathcona, Wetaskiwin, Calgary, Medicine Hat(Lethbridge and Red Deer have endorsed the petition of the Slocan lead miners and have forwarded resolutions to the Government at Ottawa along these lines. It looks as though the Slocan people would get their way, if hard work and pertinacity will gain them their end.

It is now known that the cause of the close-down of the Hall Mining & Smelting Company was the loss that was being incurred at the smelter. During 18 months' operation the Silver King mine produced a profit of $30,000 and the Emma made about $15,000, but all of this was converted into a loss of $24,000 at the smelter. This was no doubt mostly caused by lack of modern facilities, but part of its was due to mismanagement.

The hopes of the Slocan miners who have quantities of zinc in their ore are all hanging on the zinc smelter, now about completed. The process (electric) being installed has been successfully tried on the continent, and should prove satisfactory here if properly worked.

The new company that has taken over the affairs of the Ymir mine are said to have sufficient funds to do the work that is necessary to place the Ymir mine in the position it should be in. Development work and lots of it will have to be done, and it is stated that the men now in charge are in a position to do this work vigorously.

Spokane men have staked placer claims on the Columbia river at its confluence with the Pend d'Oreille. The company will purchase a dredge and work it on these claims. They should be able to locate gold with their dredge, as it was found in quantities on on the benchland in the early days.

Slocan—E. Kootenay.

The property of the Sullivan Group Mining Company is in the hands of the sheriff. The Crow's Nest Pass Coal Company has taken action to collect a bill of $7,000 for coke, and the employees of the mine and smelter have filed liens for $20,000 for their January and February wages. A. I. Goodell has entered proceedings for $10,000 for alleged breach of contract. The company has levied an assessment of 7 cents per share, which is necessary to clear up the present indebtedness of $50,000 and the outstanding bonds, amounting to $225,000. The assets of the company are its smelter, valued at $500,000, and the mine, with 150,000 tons of ore blocked out, which will average 15 per cent. lead and 6 1-2 ounces silver. It is stated that at the annual meeting some of the clouds were cleared away and that work will be resumed in a short while.

Thirty men are now employed at the Hewitt. The small tram has been conencted up to the main one. They have a considerable quantity of low grade ore in sight. Work will be resumed on the Alpha early this month. The assets of the Pioneer Mining Company, owning the Black Prince, Bank of England and other claims, have been sold to a syndicate of Nelson men, headed by C. Bell of that city. They have located a body of hard iron oxide ore in the old upper workings of the North Star. This ore is shot through with native silver. It is to be regretted that they have not opened up this ore in the lower workings of the Star. The Victor-Silver Leaf group, near Fort Steele, owned by Spokane people, is showing up well under development work. Iron pyrites in the ore carry from $10 to $12.60 in gold. The Great Northern Railway has promulgated a new rate on coal, by way of the Fernie-

Michel extension to points in Idaho and Washington, of $2.25 per ton. This rate is twenty-five cents lower than the old one.

Coast, Etc.

Ore that carries from $60 to $100 in copper is being taken out of the Ikeda mines by the Japanese owners. Obout 20 tons per day is being mined at the present time, but orders have been placed for an addition to the plant, and when the new machinery is installed the output will average 50 tons per day. The Treadwell Gold Mining Company is having trouble with its employees, and it has been found necessary to send troops to Treadwell as a measure presentative to violence.

GENERAL MINING NEWS

NOVA SCOTIA.

Sydney.—The Dominion Coal Company's shipping fleet this year numbers sixteen steamers, six of which are owned by the Company, the balance being charter boats, most of the latter being big vessels, over 6,000 tons. The list is as follows, with capacity tonnage:

	Tons.
Owned by company—	
Bonavista	1,200
Cabot	440
Cacouna	1,750
Cape Breton	2,250
Coban	1,200
Louisburg	2,200
Chartered steamers—	
Borgestad	6,600
Dominion	5,650
Fornebo	6,000
Kron Prinz Olav	6,600
Mystic	5,600
Catalone	5,700
Stigstad	6,600
Tanke	800
Ocean	6,600

The first sailings of coal steamers for the St. Lawrence during the last seven years have been as follows:

1901 Louisburg	April 22
1902 Alderney	April 14
1903 Alderney	April 15
1904 Britanica	April 20
1905 Britanica	April 22
1906 Scottish Hero	April 17
1907 Fornebo	April 18

Operations at the site of the Dominion Iron & Steel Company's coal areas, near Port Morien, have been practically suspended for a short time. For the past few months a party of over 40 was engaged in boring for a new slope and drilling at the site, and excellent progress was made. A sufficient quantity of coal of excellent quality was mined to run the engines and drills, and was extracted with little difficulty. A sufficient staff has been retained at the areas drilling and keep the engines running.

ONTARIO.

Ottawa.—The first instalment of coin turned out from the Canadian Royal Mint at Ottawa was distributed on April 2nd. A total of $24,000 was sent to various parts of the country.

The coins were all denominations, and an equal quantiy, so far as value was concerned, of each class, was sent out.

There were twelve thousand 50-cent pieces, 24,000 25-cent pieces, 60,000 10-cent pieces, and 120,000 5-cent pieces, making $6,000 worth of each demonination.

The money was shipped by Dominion Express to the receivers-general in Toronto, Montreal, Vancouver, an dother cities, who will deal the coins out as they are applied for.

Deloro.—From the reduction works of the Deloro Mining & Smelting Company more than eight tons of silver bullion have already been shipped.

Cobalt.—It is not probable that there will be friction between the operators and the miners' union this spring. The nine hour shift will be considered seriously by both sides.

The high grade ore of the O'Brien mine is being shipped to Deloro.

The first carload of 30 tons of high grade concentrates and ore has been shipped from the Coniagas mine to the Thorold smelter.

The City of Cobalt Mine has arranged to ship two cars of low grade ore to Trail, B.C.

BRITISH COLUMBIA.

Victoria.—Official notice was given in the British Columbia Provincial Gazette of the last week of March that a section of Moresby Island is reserved for Government purposes. The notice read thus: Notice is hereby given that the following described tract of land, situated on Moresby Island, Queen Charlotte group, is reserved for Government purposes: Commencing at a point at the southwest corner of Harriet harbor, Skincuttel Inlent, Moresby Island; thence south 40 chains; thence east 60 chains; thence north 160 chains; thence west to the shore; thence southerly following the shore line to the point of commencement. The area reserved is close to the Ikeda and the Swede mines. It is supposedly well-mineralized.

Vancouver.—The Tyee smelter has taken an option on the Leckie group of claims on Moresby Island.

Nelson.—In the week ended March 28th the War Eagle mine shipped 850 tons of ore, averaging $42 per ton. Of this amount 200 tons came from the 11 foot or deepest level in the mine. This ore averaged $55 in gold to the ton.

Official announcement is made that the Granby Consolidated Company will expend $200,000 in enlarging and improving its smelting plant at Grand Forks, B.C. The ore and coke bunkers just completed are included in the appropriation. The other improvements to be made this year will give the works a capacity of 4,500 tons a day.

Rossland.—Deep mining is to be a feature of the Centre Star and its allied mines. The main shaft is to be deepened from the fourteenth to the sixteenth level, which will give a total depth on the dip of the ledge of about 2,400 feet. This depth should bring the workings down to the permanent water line, where it is thought by prominent mining experts there will be a considerable change for the better in the ore deposits. It is thought that the mines here, should the ore prove fairly rich at depth, can be mined at a profit to a depth of 5,000 or 5,500 feet. There is not much water to contend with, which is an important consideration, as it costs considerable to keep the water pumped from the workings of wet mines. Good ore is being met with on the lower levels of both the Centre Star and War Eagle of late, which greatly encourages the management. The ore body on the Blue Bird has widened out to

four and a half feet. The ledge is strong and well defined. This is the most important find that has been made in the south belt for a good many years. A steam drill has been installed, and, as there was a boiler on the property, the development work and the extraction of ore can be done with more speed and less expense than when the work was all done by hand.

CRANBROOK.—The Sullivan smelter at Marysville and the mine equipment at Kimberley have been seized by Deputy Sheriff Morris. Two executions for $861 and $785 respectively have been issued. A writ also has been served for $7,000 at the suit of the Crow's Nest Pass Company for coal and coke supplied during the past few months.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Stavely Coal & Iron Company, Derbyshire, have just had their new Devonshire works completed at a cost of £300,000. The plant consists mainly of blast furnaces, built on the latest principle.

South Wales has made a new record for coal production, the figures for 1907 approximating 50,000,000 tons. The most remarkable growth has been in the output of anthracite in the Glamorganshire district.

The rescue station and experimental gallery erected by the Lancashire and Cheshire Coal Association at Howe Bridge, Atherton, for the collieries in the Bolton and Wigan districts was officially opened on the 2nd inst.

NORWAY.

The owners of the old Ranen lead and silver mines have concluded an arrangement with the Compagnie Laval to exploit a new process for zinc. A number of cyclone furnaces are to be built at these mines to obtain zinc oxide, and also an electric furnace at Trondjem, or some other suitable point.

The Hassel iron mines at Skotselven, which have not been worked since 1854, are to be started again.

FRANCE.

The Central Committee of French Collieries has placed at the disposal of the Commission appointed to investigate mine explosions a firedamp experiment station at the Lievin mines with an experimental gallery. Another experiment station is to be built in the Pas-de-Calais for testing and repairing rescue apparatus.

AUSTRIA.

Coal said to be of excellent quality has been discovered in the Vorarlberg, near Bregenz, and favorable results have attended the sinking of bore holes at Orleau.

BELGIUM.

The output of pig iron during the first two months of 1908 was 235,360 tons, as compared with 236,860 for the corresponding months of last year.

AUSTRALASIA.

Several large outcrops of copper ore have been discovered between Jingellic and Ournie, New South Wales, on the western slope of the range overlooking the Murray river.

The granulation plants erected by the Minerals Separation Company at the Central mine, Broken Hill, New South Wales, with a capacity of 3,000 tons of tailings weekly, have started work on a dump of 300,000 tons.

The Cobar gold mines, Fort Bourke, New South Wales, which have been idle for some years, have resumed crushing operations. The Elmore concentrating process for treating refractory ores is being installed.

SOUTH AFRICA.

The Transvaal Government has increased the amount of prizes to be awarded for the stope drill contest in 1909 under actual mining conditions, so that it will be possible for the winner to gain £4,000. It is proposed that the test be continued for some four months.

Six months' work on the tin mine of the Transvaal Government on the Zaaiplaats farm is regarded as having proved the value of the tin fields in the Potgeitersrut district. A four foot reef has been struck and traced for 250 yards and is stated to assay 30 per cent. tin. On the neighboring farms a number of men are working with good results.

Native labor is stated to be more plentiful than at any time in the history of the Rand. There has been a large influx, owing to the general depression and the cessation of public works throughout South Africa.

There is a continuous increase in the number of gold properties in Rhodesia operated by small workers, owing to the policy of the Butish South Africa Company in making them advances for the purchase of machinery. In January there were 175 of these mines at work.

UNITED STATES.

Bituminous coal miners to the number of about 250,000 men in the Middle and Western States went on strike on the 1st inst. on account of the failure of the United Mine Workers and the mine operators to agree upon a wage scale. A conference between the employers and men of the central mining field, including Illinois, Indiana, Ohio and Western Pennsylvania, was arranged to be held at Toledo, Ohio, on the 15th inst. to effect a settlement.

About 70 miners lost their lives by two explosions on the afternoon and night of March 28th in a mine of the Union Pacific Coal Company at Hanna, Wyoming. The first explosion killed 18, the other victims being a party of rescuers under Mine Inspector D. M. Elle.

A deposit of barite near Cartersville, Georgia, is being mined on a large scale.

The Copper Queen Company of Cochise County, Arizona, produced approximately 7,000,000 pounds of copper from eight furnaces in February.

MEXICO.

The Anglo-Mexican Mining & Exploration Company, with $650,000 capital, has started work on the Justicia group of mines in Jalisco.

The smelting plant of the Greene-Cananea Copper Company has been thoroughly renovated and nearly 1,000 men are now employed.

Mr. John Hayes Hammond has become interested in a project to develop the Laduz group of mines in Guanajuato, and a large company, capitalized at several millions, will shortly be organized. It is proposed to erect a reduction plant with the usual capacity of 1,000 tons per day.

STATISTICS AND RETURNS.

STATEMENT OF BOUNTIES PAID ON IRON AND STEEL DURING THE CALENDAR YEAR 1907.

	Pig Iron.	Steel.
Dominion Iron & Steel Co., Ltd.	$313,573.42	$497,212.07
Hamilton Iron & Steel Co., Ltd.	121,422.26	102,124.04
Nova Scotia Steel & Coal Co., Ltd.	63,343.25	115,867.08
Canada Iron Furnace Co. (Radnor)	13,850.09	.....
Canada Iron Furnace Co. (Midland)	32,577.79	.....
John McDougall & Co.	5,200.93	.....
Londonderry Iron & Mining Co., Ltd.	43,534.61	.....
Algoma Steel Co., Ltd.	177,570.26	378,698.73
Deseronto Iron Co., Ltd.	4,487.00	.....
Atikokan Iron Company, Ltd.	17,210.46	.....
Electric Reduction Co.	235.20	.....
Lake Superior Iron & Steel Co., Ltd.	.....	5,719.68
Ontario Iron & Steel Co.	.....	251.77
Totals	$793,005.27	$1,099.873.37

CORRECTION.

The Crow's Nest Pass Coal Company's output. The item on page 124 of the Journal should have read thus:—

Coal in 1907	981,939
Coal in 1906	806,901
Coke in 1907	231,368
Coke in 1906	213,295

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending March 21st was 18,458 tons, or a daily average of 3,076 tons. For the corresponding week of last year the output was 20,674 tons, a daily average of 3,445 tons.

The output of the collieries of the Crow's Nest Coal Company for the week ended March 27th was 15,688 tons, or a daily average of 2,615 tons. For the corresponding week of last year the output was 20,434 tons, a daily average of 3,406 tons.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ended April 5th was 19,687 tons, a daily average of 3,281 tons. For the corresponding week of last year the output was 18,970 tons, a daily average of 3,162 tons.

For the month of March the output of coal in the three collieries of the Nova Scotia Steel & Coal Company was another record-breaker.

The new No. 4 colliery is not included in the figures given, as it is practically idle while new electric machinery and equipment is being installed.

	Tons.
No. 1	23,124
No. 3	26,635
No. 3	7,645

This gives a total of 57,404 tons, which is an increase over last month, with No. 4 colliery included, of 4,604 tons.

The same activity prevailed at the steel plant, there being 6,200 tons of iron turned out, coke 8,592 tons, and steel 7,200 tons, which is about 2,000 tons more than for the month of February.

DOMINION COAL COMPANY'S OUTPUT FOR MARCH, 1908

No. 1 colliery	50,101
No. 2 colliery	69,494
No. 3 colliery	34,057
No. 4 colliery	44,997
No. 5 colliery	53,059
No. 6 colliery	21,849
No. 7 colliery	7,038
No. 8 colliery	15,916
No. 9 colilery	34,140
No. 10 colliery	13,478
	344,129

Shipments from the collieries of the Cumberland Railway & Coal Company, Springhill, N.S., for the month of February were 35,400 tons; for March, 38,656 tons.

NEW LISKEARD ORE STATEMENT.

Week Ending March 21st, 1908.

March 17th, Casey Mining Company, to R. C. Farrell & Company, Glasgow, Scotland, 40,000 pounds.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	Week end Mar. 21 Ore in lbs.	Since Jan. 1 Ore in lbs.
Buffalo	65,700	409,540
Kerr Lake	63,080	207,370
La Rose	140,000	707,732
Nipissing	63,230	820,170
Nancy Helen	80,420	80,420
O'Brien	252,410	1,325,040
Silver Queen	60,000	356,700
Townsite	40,000	85,100
Temiskaming	61,420	238,536

The total shipments for the week were 826,260 pounds, or 413 tons.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	Week end Mar. 21. Ore in lbs.	Since Jan. 1 Ore in lbs.
Coniagas	61,340	322,210
Cobalt Lake	64,310	186,610
City of Cobalt	127,970	228,080
Kerr Lake	63,010	270,380
La Rose	140,000	847,732
McKinley	61,900	757,980
Nipissing	63,320	820,170
Temiskaming	121,600	237,210
Trethewey	66,020	304,556

The total shipments for the week were 706,350 pounds, or 353 tons.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	Week end April 4 Ore in lbs.	Since Jan. 1 Ore in lbs.
Buffalo	62,780	472,320
Coniagas	58,700	380,910
Cobalt Lake	.....	180,610
Cobalt Central	.....	49,700
City Cobalt	.....	288,080
Drummond	.....	92,340
Foster	.....	168,600
Kerr Lake	.....	270,380
King Edward	.....	127,240
La Rose	238,820	1,086,552
McKinley	80,640	838,620
Nipissing	80,000	900,170
Nova Scotia	.....	80,790
Nancy Helen	60,000	140,420
O'Brien	59,280	1,384,320
Right of Way	.....	60,210
Provincial	93,210	143,210
Standard	.....	39,730
Silver Queen	123,500	480,200
Silver Cliff	.....	52,000
Silver Leaf	.....	62,000
Townsite	.....	85,100
Temiskaming & H. B.	.....	318,000
Temiskaming	.....	237,250
Trethewey	182,560	487,110
Watts	.....	114,430

The total shipments for the week were 1,039,530 pounds, or 519 tons. The total shipments from January 1 to date are 8,915,248 pounds, or 4457 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000. In 1904 the camp produced 158 tons, valued at $130,217; in 1905, 2144 tons, valued at $1,473,196; in 1906, 5129 tons, valued at $3,900,000.

SHIPMENTS FROM THE COBALT DISTRICT FOR THE MONTH OF MARCH, 1908.

Mine.	Tons of 2,000 lbs.
Buffalo mines	53.35
1. Casey Mountain	20.00
City of Cobalt	60.97
2. Cobalt Lake	30.76
Cobalt Central	24.85
Coniagas	93.30
Kerr Lake	92.73
King Edward	25.90
La Rose	398.37
McKinley-Darragh	121.33
Nancy Helen	69.52
3. Nipissing	125.93
Nova Scotia	20.00
O'Brien	258.78
Provincial mine	24.60
Right of Way	29.35
Silver Queen	19.59
Temiskaming	56.12
Temiskaming & Hudson Bay	36.15
Townsite Mining Company	20.56
Trethewey	153.11
Total	1,835.27

This was shipped as follows:—

Canada, 713.56 tons, or 38.88 per cent.
England, 30.56 tons, or 1.66 per cent.
Scotland, 20.00 tons, or 1.09 per cent.
Germany, 31.45 tons, or 1.72 per cent.
United States, 1,039.70 tons, or 56.65 per cent.
Totals, 1,835.27 tons, or 100.00 per cent.

Notes.—1. Shipped from New Liskeard to Scotland. 2. 410 lbs. shipped by express. 3. 1,000 lbs. shipped by express.

BRITISH COLUMBIA SHIPMENTS.

Following are the shipments for the past week, ended April 4th, and year to date:—

Boundary Shipments—

Mine.	Week.	Year.
Granby	24,687	271,433
Other mines	.....	462
Total	24,687	271,895

Rossland Shipments—

Centre Star	3,461	45,149
Le Roi	1,756	21,820
Le Roi 2	695	8,700
Iron Mask	38	38
Other mines	.....	462
Total	5,950	76,169

Slocan—Kootenay Shipments—

St. Eugene	419	7,091
Whitewater	46	358
Whitewater, milled	280	3,780
Poorman, milled	250	2,600
Queen, milled	185	2,395
Second Relief, milled	145	1,085
Richmond	28	468
Rambler-Cariboo	24	347
Nugget	24	306
Kootenay Belle, milled	25	175
Silver Cup	35	82
Mother Lode	15	15
Other Mines	..	13,332
Total	1,476	31,901

GRANBY SHIPMENTS.

For the purposes of comparison, the following table will show the output of the Granby mines for each month of the first quarter in 1907 and also in 1908, in tons:—

	1907	1908
January	34,192	74,203
February	32,465	80,155
March	63,826	110,223
Total	130,483	264,581

Granby shipments for week ended April 4th were 24,687 tons, against 27,288 tons the week previous. The total to date is 27,288 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Following are the shipments for the week ended March 28th and year to date:—

Boundary Shipments—

Mine.	Week.	Year.
Granby	27,288	246,746
Sally	23	67
Other mines	.....	395
Total	27,311	247,208

Rossland Shipments—

Centre Star	3,219	41,688
Le Roi	1,564	20,064
Le Roi No. 2	360	8,005
Evening Star	31	455
Other mines		7
Total	5,174	70,219

Slocan Kootenay Shipments:—

Total	1,879	30,425

The total shipments for the past week were 34,364 and for the year to date 347,852 tons.

BRITISH COLUMBIA SMELTER RECEIPTS.

Week Ended March 28.

Granby smelter receipts, Grand Forks, B.C., week, 27,288; year, 246,746.

Consolidated Company's receipts, Trail, B.C., week, 5,076; year, 66,026.

Le Roi smelter receipts, Northport, Wash, week, 1,564; year, 20,064.

Other mines, year, 1,390.

Total, week, 1,564; year, 21,454.

The total receipts at the various smelters for the past week were 33,928 tons and for the year to date 339,956 tons.

SOUTH AFRICAN JANUARY RETURNS.

Labor.—Gold Mines—Witwatersrand, 16,763 whites, 123,001 colored, 33,849 Chinese; other districts, 759 whites, 10,514 colored; total for Transvaal, 17,522 whites, 133,515 colored, 33,849 Chinese. Coal Mines—Total for Transvaal, 469 whites, 9,154 colored. Diamond Mines—Totals for Transvaal, 877 whites, 8,209 colored.

Coal Output.—Tota for Transvaal, 247,853 tons; value, £65,614.

Silver Output.—Total for Transvaal, 62,469 ounces; value, £7,305.

Gold Output.—Total for Transvaal, 561,166 ounces fine gold; value, £2,383,682.

Diamond Production.—The diamond production of the Transvaal, July-December, 1907, was as follows:—Number of mines contributing, 11; average number of diggers contributing, 27; total loads washed, 4,105,828*; carats of diamonds, 1,164,557; estimated value, £1,044,225.

*Includes 189,362 loads overburden.

Base Metals.—The base metal production for the month was as follows:—Copper ore, tons of 2,000 lbs., 42.5; estimated value, £1,360. Galena (lead), tons of 2,000 lbs., 461.8; estimated value, £3,487. Tin ore, tons of 2,000 lbs., 66.0; estimated value, £3,500. Flint, tons of 2,000 lbs., 82.0; estimated value, £732. Miscellaneous, tons, of 2,000 lbs., 32.2; estimated value, £966. Lime, tons of 2,000 lbs., 2,656.0; estimated value, £4,888.

Market Reports.

Coke.

April 8th.—Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.65 to $1.75.
Foundry coke, prompt, $2.15 to $2.25.

Pig Iron.

April 8th—Pittsburg—

No. 2 foundry, $16.15 to $16.65.
Bessemer, $17.50 to $17.90.
Basic, $16.15 to $16.40.
Malleable, $16.90 to $17.15.
Southern No. 2, $16.90 to $17.40.

Other Metals.

April 8th—New York—

Tin, Straits, 31.75 cents.
Copper, prime lake, 13 cents.
Lake, arsenical brands, 12.875 to 13 cents.
Electrolytic copper, 12.875 to 13 cents.
Sheet copper, 17 cents.
Copper wire, 14.5 cents.
Lead, 4 cents to 4.05 cents.
Spelter, 4.7 cents.
Sheet zinc, 7.5 cents.
Antimony, Cooksons, 8.75 cents.
Aluminium, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 to $26 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, per 75 lb. flask, $45.

The reduction in the price of refined Cobalt in the United States from $2.50 per pound to $1.45, is of an extremely drastic character. Abroad the price has not suffered in the same way. The companies in the Cobalt camp, which have any quantity of cobalt, will doubtless find it advantageous to obtain quotations from the English interests. The tendency to sell direct to the London markets is likely to become more noticeable in the future with the undoubted growth of silver production in the camp.

Silver.—March 12th, 55 3-8; March 13th, 55 3-4; March 14th, 55 1-2; March 16th, 55 3-8; March 17th, 55 1-4; March 18th, 55 3-8; March 19, 55 1-2; March 20th, 55 3-8; March 21st, 55 1-4; March 23rd, 55 3-8; March 24th, 55 1-4; March 25th, 55 1-4; March 26th, 55 1-4; March 27th, 55 1-4; March 28th, 55 1-8; March 30th, 55 3-8; March 31st, 55 3-8; April 1st, 55 1-4.

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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

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The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:

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The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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Men's Tweed Suits

Regular $10.50 Value for $7.95

M.J.104. After carefully going through the different makers' samples, to which our large buying powers give us access, we selected this material on account of its worthiness in wearing qualities and its neat yet handsome pattern, which lends itself particularly well to this style of suit. By contracting for the entire output of this line, we have secured a price concession which enables us to offer our customers this big saving on an honest suit.

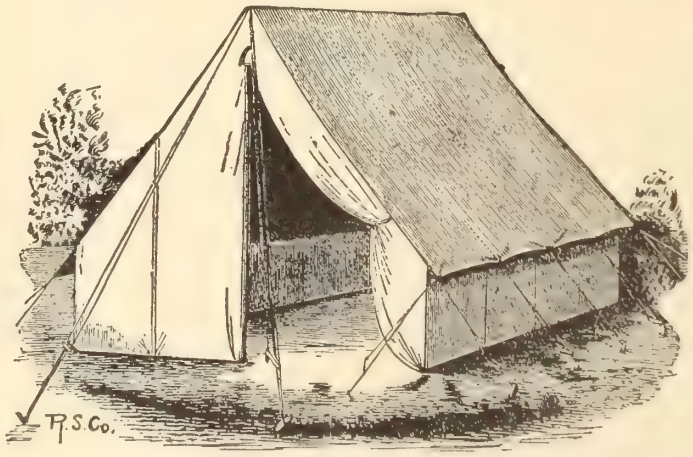


The material is an imported English tweed of durable quality, in a dark ground with lighter intermixture, giving a pepper and salt effect; into this is woven red and blue stripes and cross stripes, forming a subdued broken check pattern, being neat and quiet—a material which any gentleman would select for business or general wear, made in a single-breasted sack style, lined with a fancy twilled mohair lining, stayed with linen, shoulders and front reinforced with shrunk linen duck and hair cloth, guaranteed to retain their shape, well tailored and perfect fitting, sizes 35 to 44. Regular $10.50 value,

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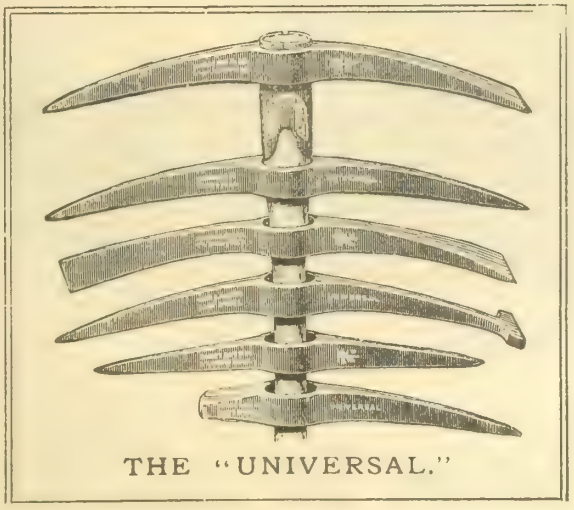
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INTERCHANGEABLE

"Universal" Picks



THE "UNIVERSAL."

They Cut More Coal in Less Time Than Any Others and Last Longer

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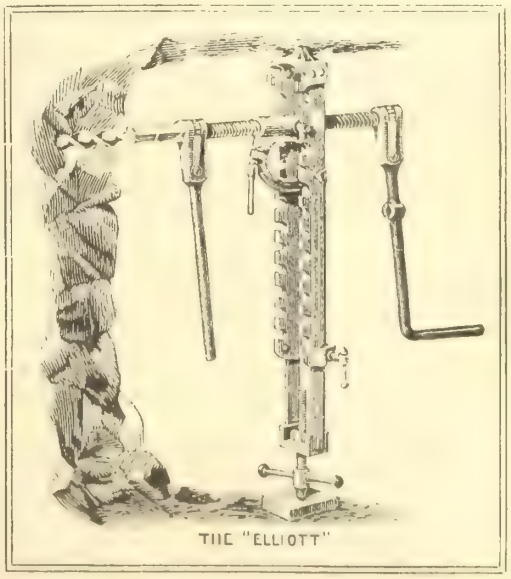
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Boring Machines

For **Hand Power**, for **Rock** and **Coal**

Fitted with Quick-Change Nuts and Automatic Feed



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Stocks of our Universal Picks and Headed Shafts kept by Messrs. Mussens Ltd.,
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Farrel Rock and Ore Crushers

STYLE "B"

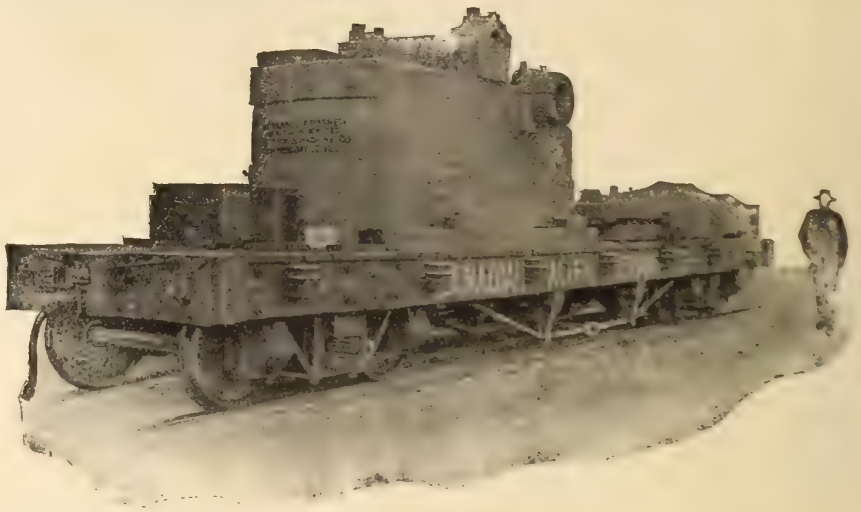
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Cut shows principal parts of our 42 x 30 crusher occupying full car of 100,000 lbs. capacity.

This machine complete weighs about 125,000 lbs.

It is the largest size Jaw Crusher so far built in Canada.

One Mining Company in B.C. already has four of them in use.



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We have made many records with our Winding, Haulage and Crane Ropes.

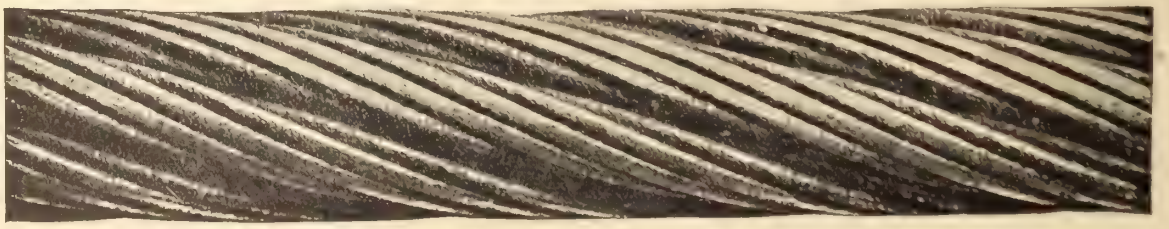


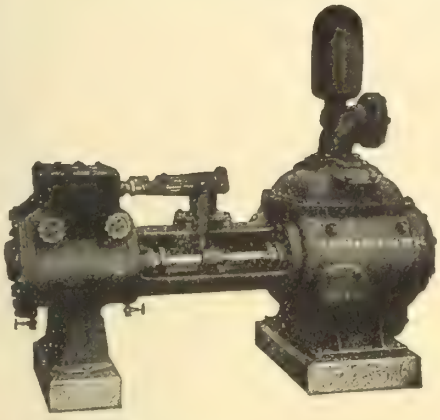
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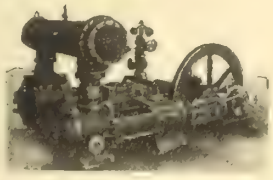
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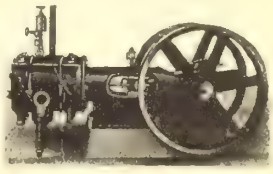
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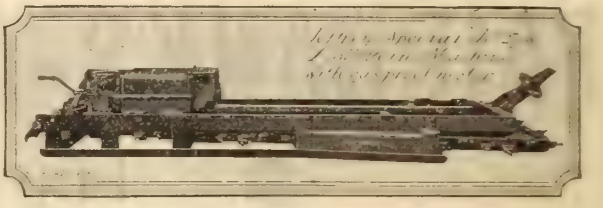
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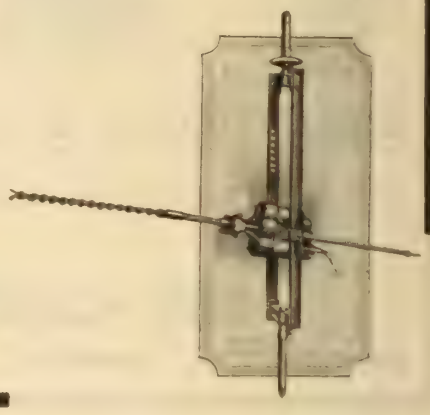
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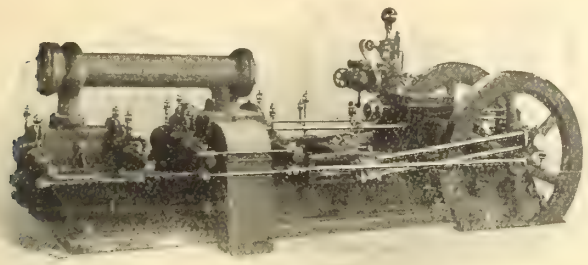
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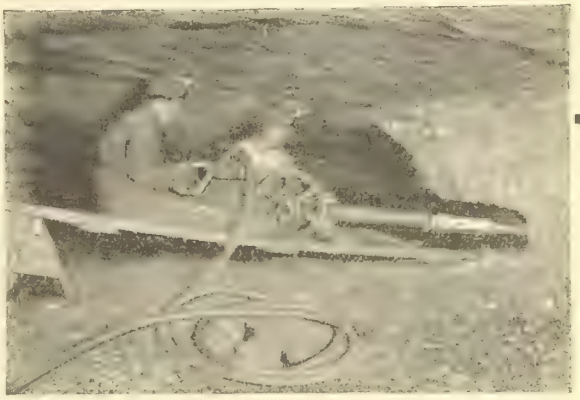
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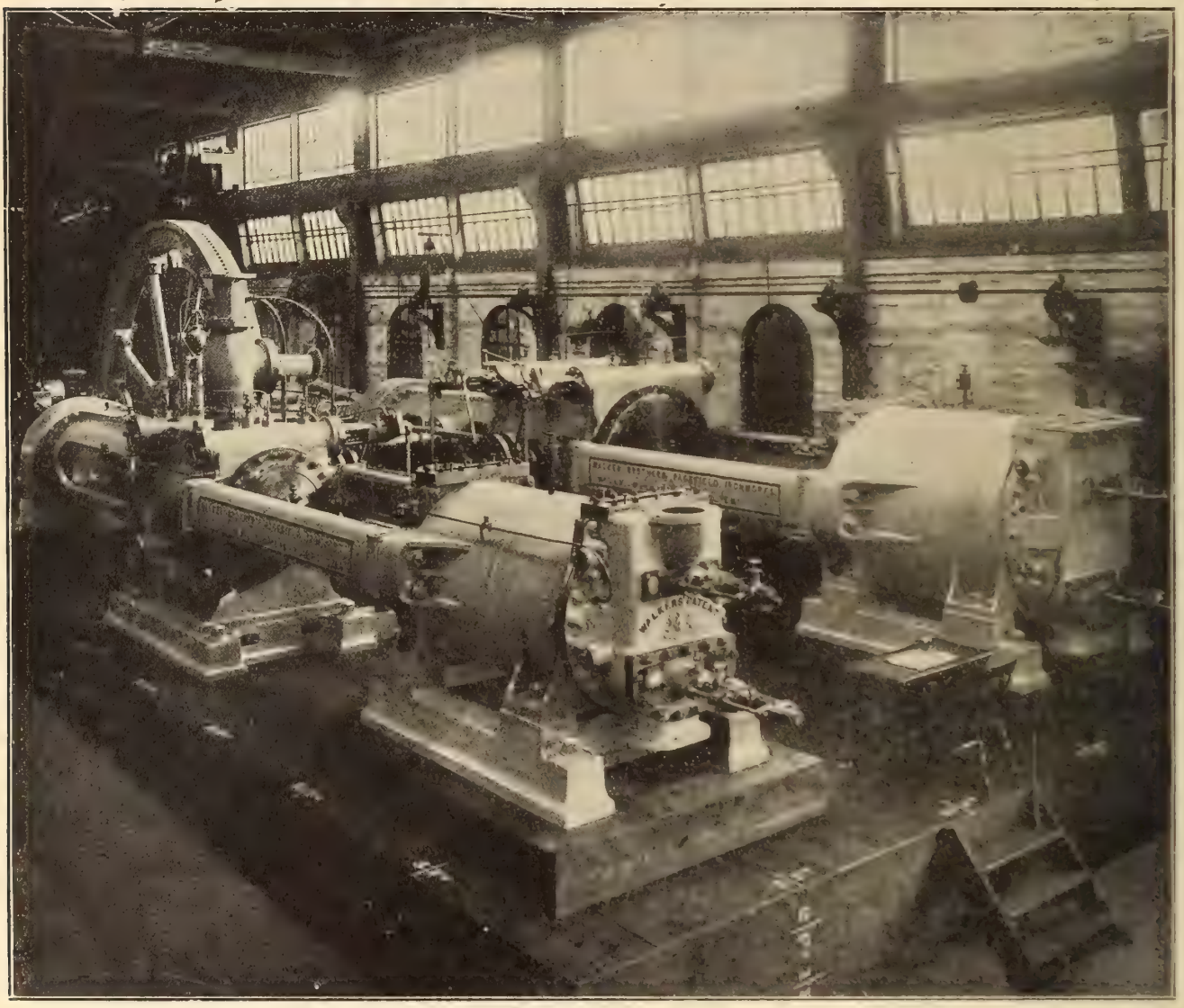
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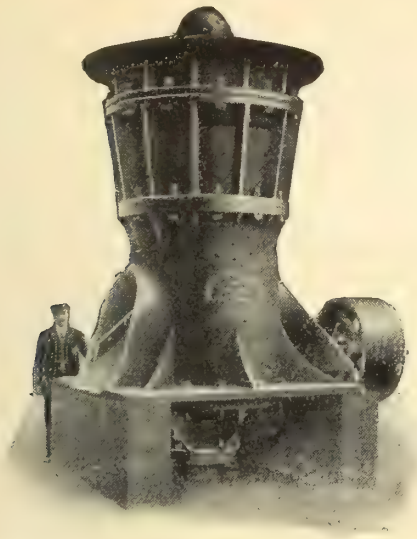
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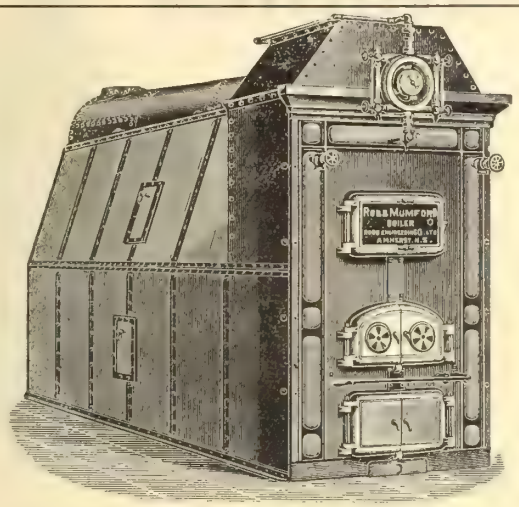
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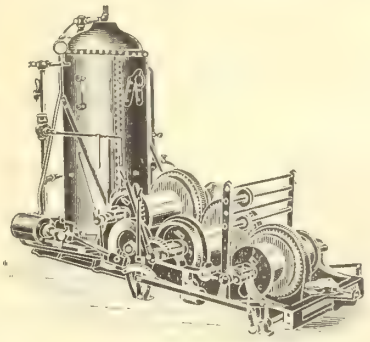
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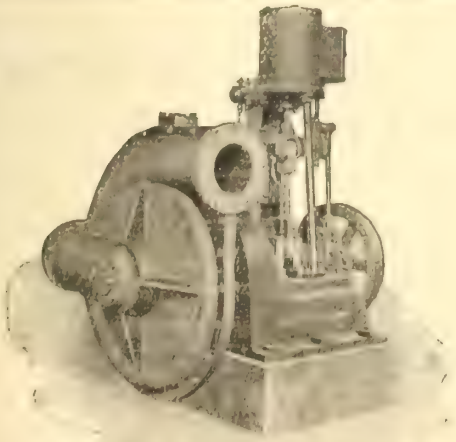
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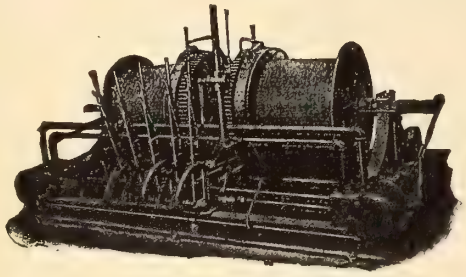
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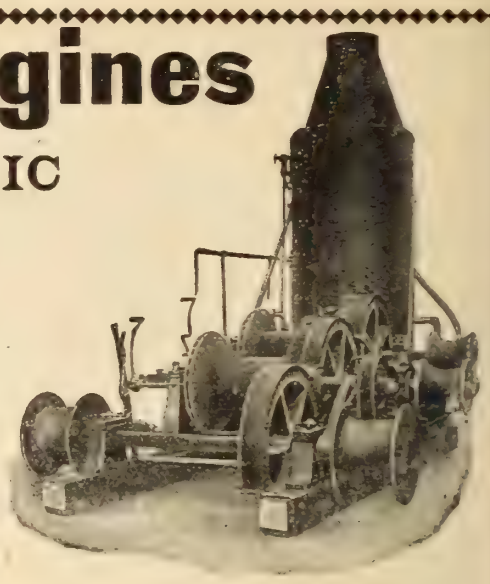
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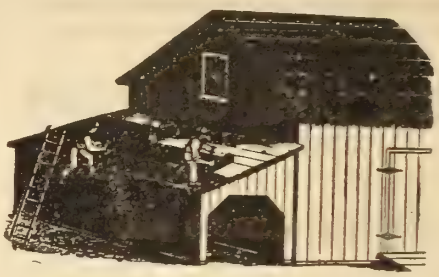
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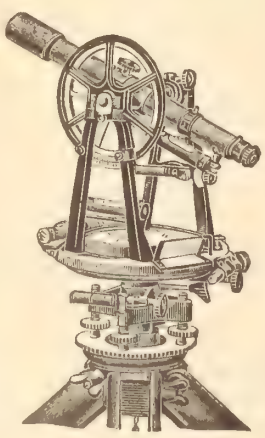
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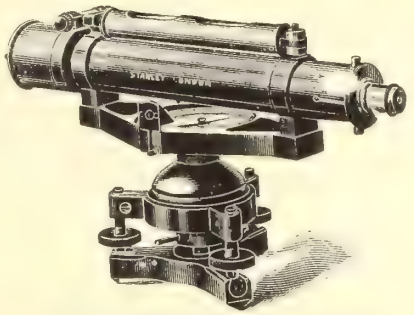
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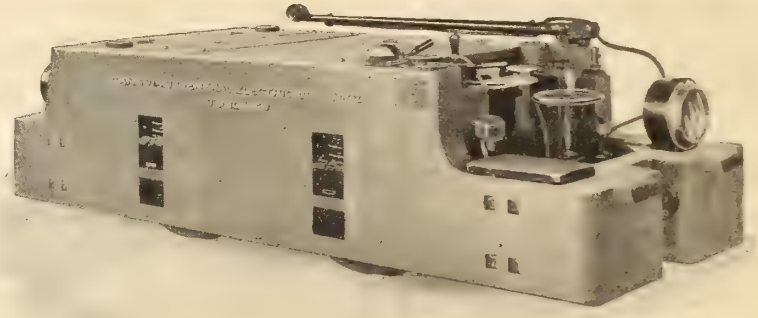
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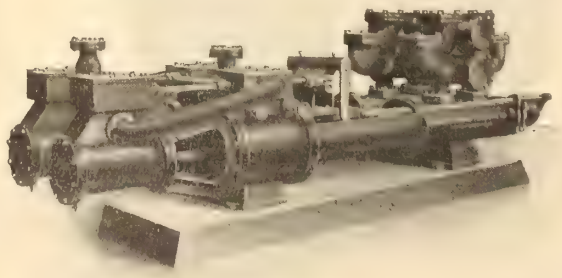
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THE OFFICIAL ORGAN OF THE CANADIAN MINING INSTITUTE

VOL. XXIX. TORONTO and MONTREAL, May 1, 1908 No. 9

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of THE CANADIAN MINING JOURNAL were printed and distributed, or an average of 3,822 per issue.

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LAWSON AND THE YUKON.

Thomas W. Lawson has been sufficiently pilloried. Technical and financial journals on both sides of the Atlantic have taken pains to apprise their readers of the fact that Lawson is a false prophet.

Were investors in Lawson's stock of an enquiring turn of mind, they could easily find out that his promises are specious. Authorities agree that he is shifting onto the shoulders of the "gelatine-spined" public an investment that at best will pay an absurdly low rate of interest.

Some one has accused Mr. Lawson of being a clever advertiser. We would consider the person who could substantiate this accusation a genius of the first water.

An advertiser Mr. Lawson is—unscrupulous, unveracious, impudent. But not one element of cleverness is to be detected in his frothings.

We are tempted to believe that those who are deluded into "blowing" themselves on Mr. Lawson's Yukon gold, deserve what they will get.

However, our space is too valuable to devote to Mr. Lawson and his lucubrations. We wish only to announce that civil proceedings are soon to be instituted against his promotion for failure to comply with the requirements of the Ontario Companies' Act. THE CANADIAN MINING JOURNAL is laying the information.

ETHICAL.

A contemporary has alluded to the apparent similarity existing between the 'Miami Company" scheme and sound English flotations. There are two important respects in which this similarity does not hold.

In Great Britain the requirements of a rigid companies' act apply to all flotations and, to a large degree, safeguard the public. No such federal enactment exists in the United States.

In Great Britain, as on this continent, it is unusual for the consulting mining engineer to play the part of promoter. In this case Mr. J. Parke Channing, vice-president of the company, is also the consulting engineer whose report is quoted in the prospectus, and upon his representations the public are asked to invest.

We may justly infer that Mr. Channing, as vice-president, is directly interested in the financial success of the Miami Copper Company. Is this in accordance with that unwritten code of ethics to which mining engineers here and elsewhere conform? Is it wholesome from a business point of view? Is not the report of an independent mining engineer indispensable?

THE HAMSTEAD MINE FIRE.

All coal-mine operators will welcome Mr. F. W. Gray's article on the use of breathing apparatus at the Hamstead mine fire.

We are not overstating the case when we say that Mr. Gray deserves the warmest praise for the efficient and practical manner in which he is taking up the subject of rescue work.

The press reports of this disaster have been incomplete and misleading. Mr. Gray's clear analysis of the circumstance is therefore timely and welcome.

It will be seen that there is no just cause for dissatisfaction with the rescue apparatus used. Also, Mr. Gray makes it evident that it is of the utmost importance that each colliery should possess its own complement of respirators and should keep a thoroughly trained corps of selected men. Both men and apparatus must be ready for instant service.

There is inspiration in the heroism of Thorne, one of the Tankersley Station men, who made repeated descents into the mine in the vain hope of saving the lives of others. His example is all the more profitable when it is known that he had trained unremittingly and had become thoroughly accustomed to the use of the Draeger helmet.

SPANISH.

Many of the graduates of Canadian mining colleges have had cause to regret their ignorance of Spanish.

A prominent and successful mining engineer residing in Mexico, has recently suggested to us that Spanish should be made a compulsory subject in the course mapped out for mining students. Since our correspondent is himself a Canadian and a graduate of a Canadian college where Spanish is not included in the mining course, he speaks with knowledge and feeling.

In our own experience we have known of numerous instances where young mining engineers were unable to accept positions in Mexico and other Spanish-American countries, simply because of their ignorance of the langauge. In all other respects they were amply qualified.

The mining engineer is the truest cosmopolite. To him neither the pink tea nor any other social futility should appeal. His country is that in which his work lies. It may be Siberia or the Yukon or Peru. But Canadian mining engineers, if they do not find work in Canada, are much more likely to look for it (and find it) in Mexico than anywhere else. Our correspondent's suggestion is therefore in accordance with the dictates of common horse-sense.

A VALUABLE REPORT.

Mr. A. A. Cole, mining engineer to the Temiskaming and Northern Ontario Railway Commission, has compiled and published a report on the Cobalt district for the year 1907.

In addition to conveniently tabulated figures of production, much useful information concerning the various smelters is included. Canadian, United States and European smelting rates and schedules are given in full. The flow-sheets of five concentrating plants are reproduced graphically.

Altogether Mr. Cole's report is interesting and valuable.

It will require the passage of but very few years to increase vastly the difficulty of finding out certain facts about the early history of Cobalt. A clear record of conditions published now is worth reams of dubious speculations some time hence. Both from a thoroughly practical and from a sentimental point of view, it is well to write history while events are yet warm in the memory.

The mining public should be grateful to the Temiskaming and Northern Ontario Commission and to Mr. Cole.

OFFICIAL BULLETINS.

The British Columbia Bureau of Mines has commenced issuing official bulletins. It is no longer necessary to await the publication of the annual report to get information concerning new districts or important work in old districts. Bulletin No. 1, by Mr. W. Fleet Robertson, Provincial Mineralogist, describes the mineral locations on Moresby Island. Here, incidentally, is situated the Ikeda mine, owned and operated by the Japanese firm of Awaya, Ikeda and Company of Vancouver.

We wish to commend to the attention of the mining departments of other provinces, this departure from established routine. As we have pointed out many times, timely bulletins are infinitely to be preferred to the bulky and belated annual reports.

Editorial Notes.

News notes, photographs and enquiries from our readers are always welcomed. Our news columns could be greatly enhanced in value if readers would advise us from time to time of happenings in mining circles. Canada is a large country.

Mr. Courtenay De Kalb, well known in Ontario, has accepted the position of associate editor of the *Mining and Scientific Press* of San Francisco. For some years, Mr. De Kalb occupied the chair of mining and metallurgy at the School of Mining, Kingston. He was also Inspector of Mines for the province of Ontario.

Mr. De Kalb is a mining engineer of wide experience. He has contributed many articles to technical papers. As a writer he is incisive and polished. We congratulate our western contemporary upon this important addition to its staff.

LE ROI No. 2, LIMITED, ROSSLAND, B.C.

GEO. A. OHREN.

A mining company that has demonstrated in a satisfactory manner that Rossland gold-copper ores can be mined at a good profit is the Le Roi No. 2, Limited, which up to the time of this writing has paid $838,000 in dividends, on a capital of £600,000 divided into 120,000 shares of £5 each, since the present company took it over from the British American Corporation, who controlled its interests to 1898. This company has not mined on as large a scale as some of the other mines in Rossland camp but its affairs have been managed in an economical and business-like manner and the result has been substantial dividends for the shareholders, who have come to look upon it as a steady and confidence worthy mining enterprise.

The group comprises the Annie, Annie Fr., Josie, No. 1, No. 1 Fr., Thekla, You Know, Rockingham, Surprise, Poorman, Golden Dawn, and Copper Queen mining claims in Rossland camp. The principal mining operations are carried on through the Josie property on which the Josie shaft, 900 feet in depth, is situated. The product of the mine is hoisted through the Josie shaft with a 150 horse power electrical hoisting engine, a duplicate of which engine they have in the shaft house on the No. 1 claim. The shaft on the No. 1 is 650 feet in depth and some of the best copper ore in the camp has been taken from the No. 1 workings. Commodious ore bins, blacksmith and machine shops, framing shop, superintendent's residence and other mine buildings are located on the Josie claim. The concentrator is situated across a small gulch from the Josie workings. The air drills used are of the 2 1-2 inch, 3 1-2 inch and 3 5-8 inch sizes. Those with the 3 5-8 inch cylinders are used for the heavy work, such as sinking, etc., while the smaller machines are used for stoping.

The mine is at present producing about 2800 tons of "first-class" ore per month, which is treated at the Trail smelter. Approximately 1,100 tons of "second-class" ore is treated each month at the concentrator. Ore from this mine occurs in much narrower veins than in the Centre Star or Le Roi but is of a very much higher grade, as will be seen by the following figures:

The "first-class" ore mined during the year ended June 30th., 1907, amounted to 18,000 tons. This ore carried:

Gold,	.707 ounces at $20.	$14.140
Silver,	.751 ounces at $0.6769c....	5.508
Copper,	1.512 per cent at $0.2188c....	6.614
	Gross value of ore per ton	$21.262



LE ROI NO. 2 AND LE ROI MINES, ROSSLAND, B.C.

The smelting charges were $6.12 per ton.

Of "second-class" ore 11,840 tons were put through the mill, which carried per ton:

Gold	.84 ounces
Silver	.144 ounces
Copper	.396 ounces

and 706 tons of concentrates were shipped which assayed as follows:

Gold	.933 ounces
Silver	.859 ounces
Copper	1.22 per cent

The output shown above, with 3,400 tons of ore left broken in the stopes, gives a total production for the year of 33,069 tons.

The cost of mining the ore is made up as follows:

Ore production	$1.95
Ore sorting	.25
General expenses	.49
Power plant	.74
Mine general	.97
Diamond drilling	.48
	$4.88
Depreciation	1.92
Total cost per dry ton mined	$6.80

The shipping ore is carried by tramway from the Josie ore bins to bins at the railway siding where it is loaded for shipment to the smelter. The "second-class" ore is conveyed by tramway to the concentrator, where it is crushed in jaw crushers and then goes into Trent Chilian mills. From the mills it is run on to four Wilfley tables arranged in two sets, the headings running over the first two tables and the product from these tables being treated on the other two. The tailings from the second tables are not treated. During the year under review it is estimated that they carried the following values:

	Cents.
Gold	.030
Silver	.098
Copper	.344

Electric power for operating the concentrating and hoisting plants is secured from the lines of the West Kootenay Power & Light Company and costs approximately $40 per horse power per annum. Compressed air for operating the mining machinery, smoke blowing, etc., is derived from the Consolidated Company's compressing plant and costs Le Roi about $20,000 per annum. Nearly forty per cent of this cost of air power is for air that is used in smoke blowing and ventilation.

Some of the costs of development work, etc., are:

Drifting and crosscutting per foot	$14.576
Stoping	4.88
Diamond drilling	2.61

The company has an option on and is working the Vancouver Group (silver-lead) near Silverton, B. C. This group consists of the Vancouver, Vancouver Fr., Zilor, Silver Star, Kelley, Napia, Ricardo, Prior and Mountain Boomer, comprising 527 acres. They are now treating about 2,400 tons per month from this property. There is no trouble separating the zinc from the lead with this ore. The zinc concentrates are sent to Antwerp under contract. The cost of milling is about 40 cents per ton. The work here is being done by hand and costs:

Drifting and crosscutting per foot	$13.24
Sinking	21.24
Raising	9.61

They shipped 21,079 tons of this ore, which assays:

Silver	13.6 ounces
Lead	3.7 per cent
Zinc	4.7 per cent

and produced 1,100 tons of lead concentrates assaying:

Silver	117.2 ounces
Lead	60. per cent
Zinc	11.3 per cent

The 1,316 tons of zinc concentrates carried:

Silver	40.4
Lead	2.3
Zinc	45.2



LE ROI No. 2 CONCENTRATOR ROSSLAND, B.C.

A quantity of picked lead ore was also shipped and the output was worth in all $119,030.

The Le Roi No. 2 holds, roughly, a one-third interest in the Conclurry Syndicate, on which they have recently received a dividend of $21,506, which is a valuable asset.

The balance in favor of profit and loss for the year was $61,897 and the balance of cash on hand at Rossland and London amounted to $22,500.

In conclusion, the Le Roi No. 2, Limited, has certainly proved that with economy and careful management the ore bodies in this district can be worked at a profit and there is no doubt that the mine will go on paying dividends to the shareholders for many years to come.

THE USE OF OXYGEN BREATHING APPARATUS AT THE HAMSTEAD MINE FIRE.

By F. W. Gray.

The English newspapers of the 6th of March record a most gallant attempt at the rescue of 21 entombed miners by trained men equipped with oxygen breathing apparatus, which was unfortunately unsuccessful.

A fire broke out in the Hamstead Mine, which is situated at Perry Barr near the city of Birmingham, on Wednesday night the 4th of March. Thirty men went down on the night shift, but of these nine managed to make their way through the smoke and fumes and escaped by way of the upcast shaft. The other twenty-one had however gone into the far workings and were cut off by the fire, which originated near the bottom of the downcast shaft. Under the direction of H. M. Inspectors rescue operations were carried on throughout the night and Thursday morning, but without avail. Telegrams were sent for the Normanton and Tankersley Rescue Corps. The Normanton men have been trained at Mr. W. E. Garforth's station at Altofts Colliery in West Yorkshire. They wear the Weg apparatus, Mr. Garforth's invention. The Tankersley Station is situated near Barnsley,South Yorkshire, and the apparatus worn by the party despatched to Hamstead was the Draeger. Full descriptions of both these stations will be found in the Transactions of the Institute of Mining Engineers. A friendly rivalry has existed between the men of these two stations for some time past, and to the call now sent they responded with the utmost promptitude. Mr. Garforth himself led the Normanton party of five men, Hopwood, Haslop, Cranswick, Whittingham and Welsby. The Tankersley party were at work in their own mines when the summons came. They were Thorne, Taylor and Outram, accompanied by A. T. Winborn the Superintendent of the Tankersley Station.

The parties arrived early in the afternoon of Thursday and proceeded at once to make preparations for descending the mine by getting acquainted with the plans. Previous to their arrival attempts had been made to penetrate the workings by rescuers unprovided with the apparatus, but they could not descent the shft. It was thought that the fire could not have reached the entombed men, who were in all probability in safety in the remoter workings, and strong hopes were entertained of the possibility of their rescue. At 3-22 p.m. three of the Normanton men made the first descent down the upcast shaft, and remained below over an hour. They returned however without having been able to find any sign of life, except a partly asphyxiated cat. The second attempt was made by two of the trained men and the manager of the mine at five o'clock. They came up at ten minutes after six, not having been able to find anyone. The third party went down at 7.30, having arranged to return not later than 9 o'clock. At 8.30 two of them came up, Thorne and Outram. Outram was overcome by the heat, but Thorne obtained fresh oxygen cylinders and again went below. He returned about nine o'clock with Whittingham, both men in a state of exhaustion. When they recovered they explained that Whitting and Welsby had penetrated some 800 yards into the mine, when Welsby was overcome by the heat and the stooping. Whittingham dragged him as far as possible, but had to leave Welsby owing to the drain on his own resources. Making his way to the shaft, he met Thorne, who had to assist him. Thorne showed most remarkable endurance, having made three distinct descents. Two other men from the Normanton party then descended to rescue Welsby, if possible, but returned without finding him. Further operations had to be postponed, as the rescuers were all exhausted, and their oxygen supply was running short. Next morning they attempted another descent, but after being twenty minutes in the shaft had to rap to be drawn up again. The shaft bottom was on fire and the heat was unendurable. Further particulars are not to hand, but we understand the twenty-one men entombed and Welsby were finally abandoned.

At the first reading it would appear as if the first use of oxygen breathing apparatus in actual rescue work in England had resulted in na practical good and had also caused the death of one man more than the number involved in the original disaster, and this being the first time these devices have been brought prominently before the public eye, it is particularly necessary that a too hasty judgment should be avoided as to the merits of oxygen breathing apparatus.

There are several points to be considered: In the first place the fire broke out on Wednesday night, and the first party of rescuers did not arrive until 3 o'clock in the following afternoon. These men were 120 miles from their main station, only a bare dozen in number, and quite strange to the Hamstead workings, which is a difficulty that all miners will appreciate. They made a magnificent effort and faced death as a matter of course. They proved once more the depths of heroism that lie latent in the miner's nature when he goes to the help of his fellows in danger. But the task set before a dozen men was too great: to penetrate an unknown and burning mine with roads only four feet high in an unbreathable smoke at a temperature over 120 degrees was an awful tax on human endurance. Had the rescuers arrived earlier they might have succeeded in their efforts. But the fact that under such circumstances men were able to penetrate 800 yards and return, to visit the stables and locate the seat of the fire, proves the capabilities of properly trained men equipped with these devices.

Several points appear to be clear from the meagre reports now at hand:

1. To be really effective and useful in time of need, oxygen apparatus should be kept on the spot, and should be available for use instantly. Had the Normanton and Tankersley corps arrived at Hamstead before the heat of the mine became so great there can be no doubt that the doomed men would have been rescued, for smoke and fumes are no hindrance to the trained men who wear these apparatus.

2. It is absolutely necessary that men be trained in the use of these apparatus in conditions that are as nearly as possible actual conditions; that is, in really unbreathable gases, and with heavy work to perform. So far as can be learned the collapse of Welsby was not due to any fault in his apparatus, but to his physical failure under the trying conditions. The unfit can only be discovered by such methods. Men who undertake this work need good lungs and a sound heart, and should be of spare

and wiry build, preferably of medium height. Thorne, the man who made three descents and showed extraordinary heroism and endurance, was a man who had trained most conscientiously, having made several weight lifting records in smoke at contests between apparatus teams. A little previously he had undergone a similar experience in extinguishing a fire at Wharncliffe, Silkstone colilery (see Journal, Vol. I., p. 523). Untrained men are worse than useless when the emergency comes. No man knows his hidden indiosyncrasy until he makes the test.

3. No party should consist of less than five men, and no man should be called upon to descend more than once in the day, otherwise his physical powers are liable to be too severely taxed. Relays of fresh men should be ready to take up the work.

4. An adequate supply of oxygen and cartridges should be at hand. Rescue parties need oxygen trunks to revive men whom they find unconscious and enable them to be carried through noxious gases to the open.

To be brief, the appropriation for rescue stations and their upkeep should be ample and sufficient. At a recent explosion in Germany eighty rescuers were present, all equipped with apparatus, etc. The number of sets of apparatus should be more than adequate, and the oxygen reserves never allowed to get below the safe point. Numerous and frequent drills are necessary, and it is foolish to exercise economy in renewals and supplies for practice. Further, the apparatus must be kept in constant use if it is to be in order when the call comes. Rescue corps differ in no wise from fire brigades in this particular. Constant practice is a prime necessity for both apparatus and men. As an example, the Tankersley station had four Draeger apparatus until lately, when forty would have been nearer its requirements. At least five apparatus for each mine served by a rescue station is the minimum that should be provided.

Up to very recently the English mines have been very poorly provided with breathing apparatus, the Normanton and Tankersley stations being the only ones. At present, however, large stations are in course of erection at Wath, South Yorkshire; in Lancashire and South Wales. Several are also to be found in Scotland, particularly that of the Fife Coal Company at Cowdenbeath.

The present experience, we think, while proving the capabilities of these apparatus, shows also the folly of half measures in the matter. If a job is worth doing at all it is worth doing well, and the provision of breathing apparatus, if contemplated at all by any mining company, should be contemplated in no niggardly way.

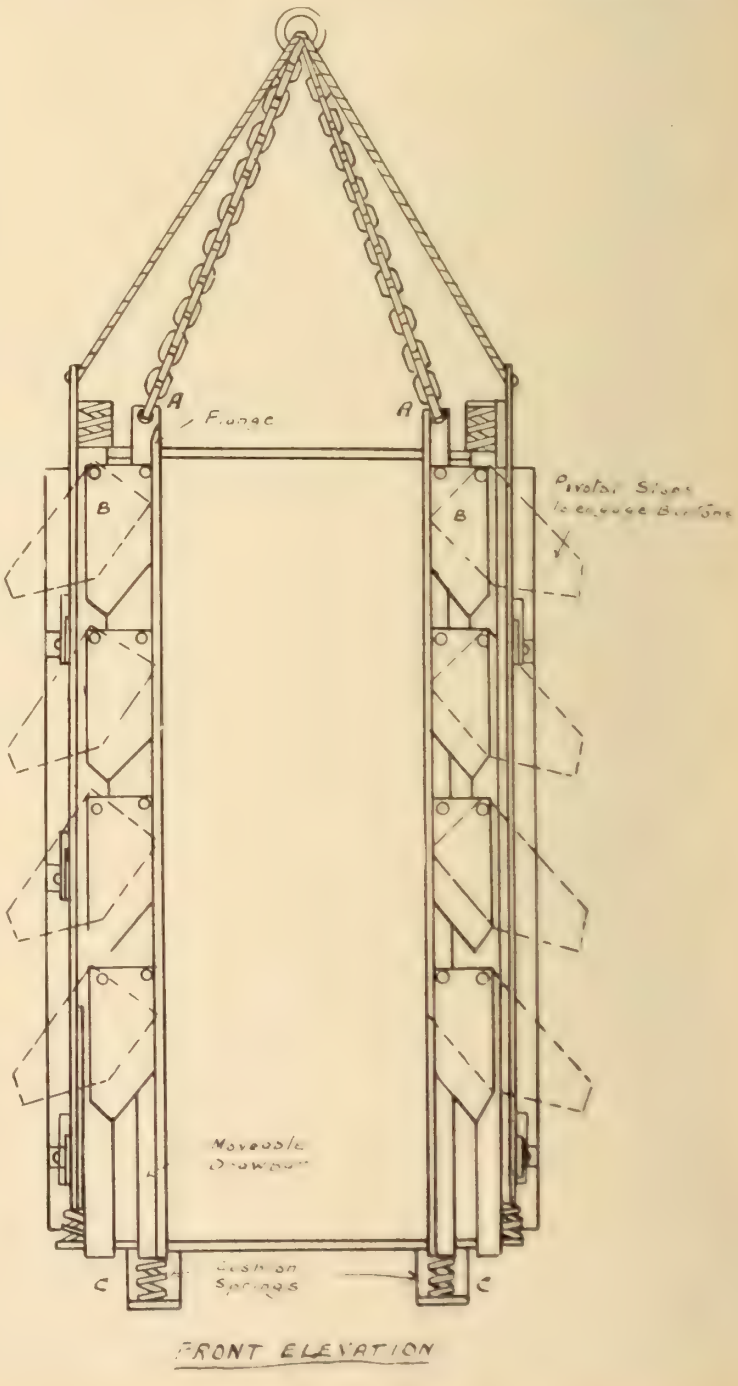
The fact that men were to be found willing to descend a strange mine, as they did at Hamstead, and trust their lives to their apparatus, shows the entire confidence they placed in its trustworthiness, and such men should not be called upon to suffer by reason of the lack of sufficient apparatus and trained rescuers. That under such conditions as prevailed in the Hamstead mine one of the volunteers succumbed is no reason for the non-provision of breathing apparatus. On the contrary, it is a reason for a more generous provision, and more extensive drill and practice work.

Another matter that strikes us very forcibly is that one mine or one company should not sponge upon another, or rest content in the knowledge that a neighboring company have men and apparatus if anything should happen in their own collieries that would make the use of breathing apparatus desirable. We know that willing volunteers will never be wanting when other men's lives are in danger, and it is hard to refuse aid under such circumstances. But what right has anybody to expect volunteers from another district to risk their lives in the unknown workings of a strange colliery at long distances from their base of supplies. Such men are like the mariner in uncharted seas, and they could be accused neither of cowardice nor inhumanity if under such circumstances they refused to endanger their lives. But we know they would not refuse, and therefore the national character of the matter becomes at once apparent.

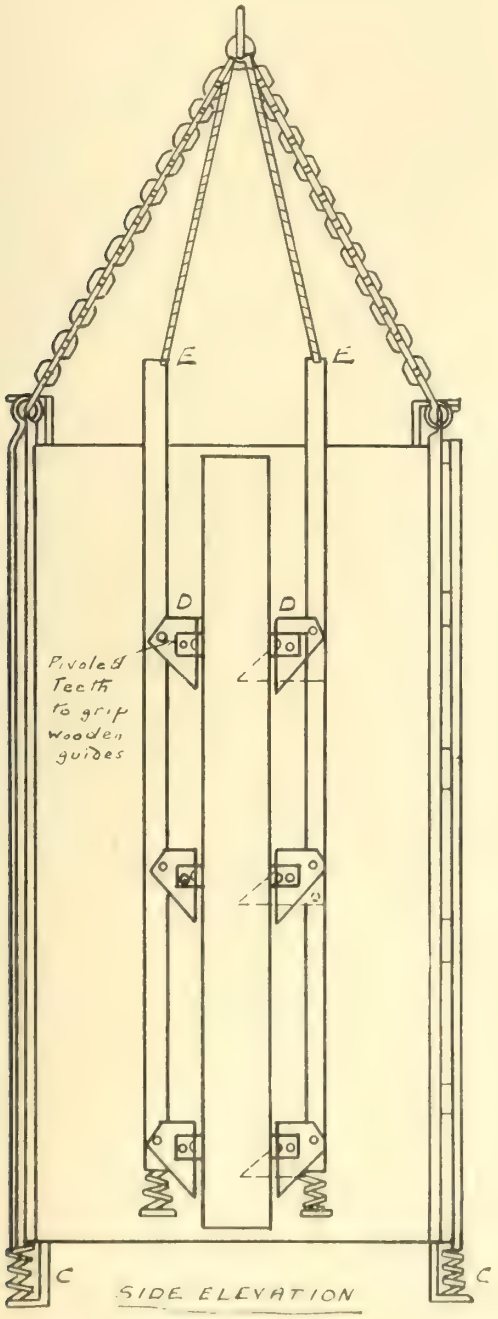
A NEW SAFETY DEVICE FOR HOISTING CAGES.

(Communicated by our Glace Bay Correspondent.)

The recent deplorable accident at Sydney Mines No.1 Shaft caused by the failure of a safety catch, whereby two valued officials lost their lives, has drawn attention



here to safety devices for the prevention of accidents due to the detachment of mine cages from their supports. A Royal Commission has just finished its work in South Africa in investigating various safety devices for use in hoisting shafts of great depths. There are many patented safety devices for arresting mine cages in case of accidental descent which are applicable to circular walled hoisting shafts fitted with wire rope guides, or the ordinary woden or iron conductors, but none of these patents would be of much use in the rectangular timbered shafts



that are the rule on this continent. A device has however been recently patented by Mark Rideout, a young Glace Bay bricklayer, which is particularly adapted for local shafts. The following sketches will illustrate the working of the device.

The cage is suspended from the shackles by moveable flanged drawbars A at each corner, attached to which are a series of pivotal stops B held in vertical position retracted against the flange of the drawbar A, so long as the hoisting rope is taut. Whenever the tension of the rope is relaxed sufficiently the weight of the drawbar A, assisted by the springs C, causes it to fall, which projects the stops B outwards, so that they engage over the buntons of the shaft lining, thereby arresting the downward progress of the cage. The springs C serve also to absorb the shock of the suddenly arrested cage. At the same time the moveable drawbars E are drawn downwards causing the triangular teeth D to bite into the wooden guides. The action of the device appears very positive, and should be applicable to hoists of all kinds.

MOISTURE IN COAL.

The determination of moisture in a sample of coal is apparently simple and a result is easily obtained. The proper relation that this result bears to the original sample is, however, not so easily determined. Variations in this relation directly affect the application of all analytical work done upon the sample and the possibility of unaccounted-for moisture losses during the taking, shipping and preparing of the sample for chemical analysis too often receives little or no attention.

Care in Preparation and Shipment of Sample.—As a rule precautions to prevent moisture losses during the taking of the sample are not given sufficient attention and the too common practice of shipping the coarse sample by mail or express in canvas bags cannot be too strongly condemned where the moisture result is expected to represent the moisture in the coal as sampled. A sample of coal in a canvas or muslin sack may and usually does lose a large proportion of its loosely held moisture while in transit in warm mail or express cars, and the moisture results on such a sample can be only the moisture present in that particular sample in a more or less nearly air-dry condition. This is a point which has been too much overlooked in the past, and as a consequence many hundreds of published analyses of coal supposedly representative of the coal as mined really lack as much as several per cent. of the moisture actually present in the sample as mined or shipped.

Failure to guard against moisture losses is not necessarily of serious consequence on samples which have been selected more or less at random and sent to the chemical laboratory for analysis. On such samples the sender understands that the particular results obtained can represent the seam of coal only in a general way. The moisture result on these samples, while low and to that extent misleading, is a minor determination, as the ash and sulphur are usually the determinations particularly desired. When samples from actual steaming tests are handled in this way the unaccounted-for moisture losses will, of course, directly affect the accuracy of the test and the heat balance in such a case is necessarily misleading, as the coal usually analyzes better than the coal as actually fired under the boilers. This makes the unaccounted-for losses larger by perhaps several per cent. then they should be and some coals with an originally high moisture content and and consequent high moisture loss may be made to appear superior to really better coals with an originally low moisture content and a consequent lower moisture loss in transit to the laboratory. If correct moisture results are desired, the only safe way is to have the sample shipped from the mine or testing plant in air-tight cans, as was recommended by the committee.—E. E. Comermeier, in Mines and Minerals for April.

REPORT ON COBALT DISTRICT FOR YEAR 1907.

By ARTHUR A. COLE.*

The first seven pages of Mr. Cole's report to the Commission is taken up with statistics of ore shipments, most of which have appeared in different forms in previous issues of THE CANADIAN MINING JOURNAL. In the report, however, Mr. Cole has arranged the output of each mine by months for 1907 and by year for 1904 and 1907, inclusive.

On page 8 begins a list of smelter purchase schedules, etc., which is well worth reprinting.

One preliminary note, however, must not be omitted. Mr. Cole, alluding to the much more rapid increase of the tonnage than of the total value, explains that this indicates not that less rich ore is being encountered, but rather that a larger proportion of low grade ore is being shipped.

DISTRIBUTION OF OUTPUT.

The output for 1907 was distributed for treatment as follows:—

	Tons,	per cent.
Canada	2,585.05	17.40
England	167.34	1.13
United States	12,098.95	81.47
Totals	14,851.34	100.00

CANADA.

The Orford Copper Company.

The Orford Copper Company's smelter at Copper Cliff took almost all the ore that was shipped to Canadian smelters. At the end of the year the following was the purchase schedule and terms of settlement of the Orford Copper Company for silver and cobalt in arsenical silver-cobalt ores:—

Purchaser to make payment for—

94 per cent. of silver per ton of ore (2,000 lbs.) when same assays 4,000 ozs. and over.
93 per cent. of silver per ton of ore (2,000 lbs.) when same assays 1,200 ozs. and over.
92 per cent. of silver per ton of ore (2,00 lbs.) when same assays 800 ozs. and over.
90 per cent. of silver per ton of ore (2,000 lbs.) when same assays 500 ozs. and over.
85 per cent. of silver per ton of ore (2,000 lbs.) when same assays 300 ozs. and over.
80 per cent. of silver per ton of ore (2,000 lbs.) when same assays 150 ozs. and over.

Purchaser to make payment of—

$30 per ton of ore (2,000 lbs.) when same contains 12 per cent. cobalt and over.
$20 per ton of ore (2,000 lbs.) when same contains 8 per cent. cobalt and over.
$10 per ton of ore (2,000 lbs.) when same contains 6 per cent. cobalt and over.

No payment will be made for cobalt in ores containing less than 6 per cent. cobalt, nor in which the nickel contents are higher than the cobalt contents.

Further, the right is reserved to return, at shipper's expense, any such ores (i.e., nickel contents higher than cobalt contents) received at Copper Cliff.

Ore is to be delivered by seller to the Canadian Copper Company, f.o.b. cars, Copper Cliff, Ont., ore to be at shipper's risk until sampling is undertaken, as purchaser can assume no responsibility for the same until the ore has been taken into its sampler.

Purchaser to sample at its expense, purchaser's and seller's representatives to be present. Assays to be made at Ledoux & Company, of New York, at seller's expense, which assays are to govern in settlement.

Payment for 50 per cent. of the silver returnable to the seller, as per the above scale, to be made at the New York official price for silver on the first settlement date, which shall be 45 days after the date on which sampling of the ore is completed, the remaining 50 per cent. to be paid 45 days later. The purchaser, however, reserves the right to deliver on either or both of the settlement dates above specified, in lieu of cash, at its option, such silver bullion (commercial bar silver) as is due the seller in settlement upon these dates. Such delivery to be made in New York City.

Payment for cobalt will be made as per the above scale when the cobalt content of the ore comes within the specifications mentioned, settlement to be made 50 per cent. on each of the two due dates for silver, namely, 50 per cent. in 45 days and 50 per cent. in 90 days after the completion of sampling the ore.

Purchaser does not guarantee date when ore will be sampled, but undertakes to complete same promptly after the ore reaches its turn for sampling.

The freight rate on ore from Cobalt to Copper Cliff is $5.20 per ton.

The Deloro Smelting and Reduction Company.

The Deloro Smelting & Reduction Company, with works at Deloro, Ontario, is just starting operations on Cobalt ores and is offering the following prices for them:

Deloro Schedule.

Silver.—Ore containing 100 to 200 ozs. per ton pay 85 per cent.; ore contain 200 to 500 ozs. per ton pay 90 per cent.; ore containing 500 to 800 ozs. per ton pay 91 per cent.; ore containing 800 to 1,000 ozs. per ton pay 93 per cent.; ore containing 1,000 to 2,000 ozs. per ton pay 94 per cent.; ore containing 2,000 ozs. and over per ton pay 95 per cent.

At New York quotations 30 days after agreement of assays.

Arsenic.—Ore containing not less than 10 per cent arsenic pay for all arsenic contained:

10 per cent. to 30 per cent—1 cent per pound arsenic.
30 per cent. and over—1 1-2 cents per pound arsenic.

Cobalt.—Ore containing not less than 6 per cent. cobalt—

6 per cent. to 10 per cent. cobalt pay $10 per ton ore.
10 per cent. and over cobalt pay $20 per ton ore.

Treatment charges in all cases $10 per ton (2,000 lbs.) ore.

No charge for sampling.

No penalties for "insoluble matter."

Ore to be delivered in carload lots, f.o.b. Marmora station, Central Ontario Railway.

*Mining Engineer, Temiskaming & Northern Ontario Railway Commission.

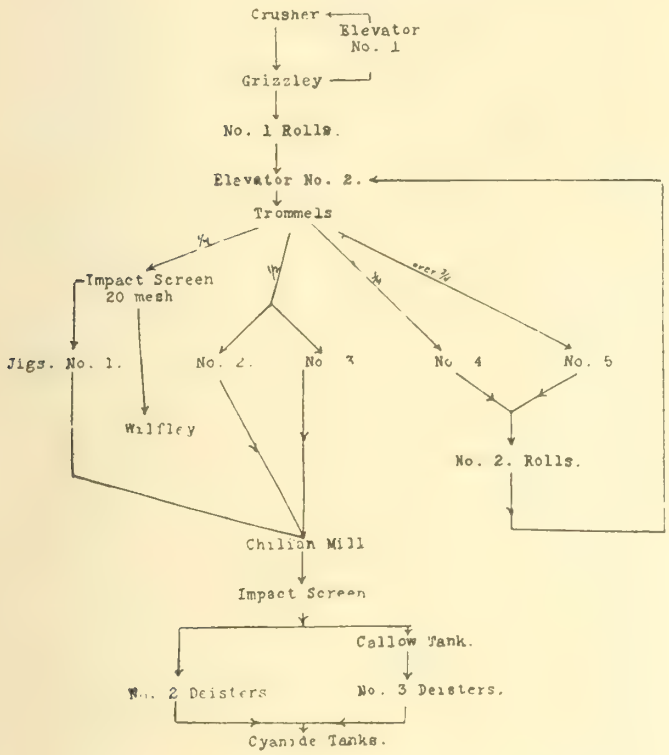
This tariff is subject to change without notice.

The freight rates on ore from Cobalt to Marmora station is $7 per ton.

ENGLAND.

The Anglo-French Nickel Company of Swansea, Wales, was the only European company that bought ores from the Cobalt camp.

(1) BUFFALO CONCENTRATOR.



This company wished ores solely for their cobalt contents, and paid nothing for the silver.

The following is the schedule of average prices paid for Cobalt ores during 1907, by the Anglo-French Nickel Company, but before the end of the year these prices were cancelled:—

8 to 10 per cent. cobalt, 30 cents per pound for metallic cobalt.
10.1 to 12 per cent. cobalt, 35 cents per pound for metallic cobalt.
12.1 to 14 per cent. cobalt, 40 cents per pound for metallic cobalt.
14.1 to 16 per cent. cobalt, 45 cents per pound for metallic cobalt.
16 per cent. cobalt and over, 50 cents per pound for metallic cobalt.

The freight rate on ore from Cobalt to Swansea, Wales, is $13.98 per ton.

UNITED STATES.

American Smelting and Refining Company.

Eighty per cent. of the camp's output went to the United States and most of this was taken by the American Smelting & Refining Company at their works at Perth Amboy, N.J.

The following is the schedule of prices offered by this company at the end of the year for silvercobalt ores:—

American Smelting & Refining Company's schedule for ores assaying under 1,500 ozs. per ton—

Silver.—Pay for ninety-three per cent. of the silver contents at the New York quotations as given by Messrs. Handy and Harman to Western Union Telegraph Company, on the thirtieth day after agreement of assays.

Working Charge.—Nine dollars per ton of two thousand pounds dry weight, plus one-half cent per ton of each ounce of silver contained.

Arsenic.—Should arsenic be contained in excess of five per cent., an addition to the working charge will be made at the rate of twenty-five cents per dry ton for each per cent. of arsenic in excess of five per cent.

Insoluble Matter.—An addition to the working charge will be made at the rate of seven cents per dry ton for each per cent. of insoluble matter contained in excess of iron.

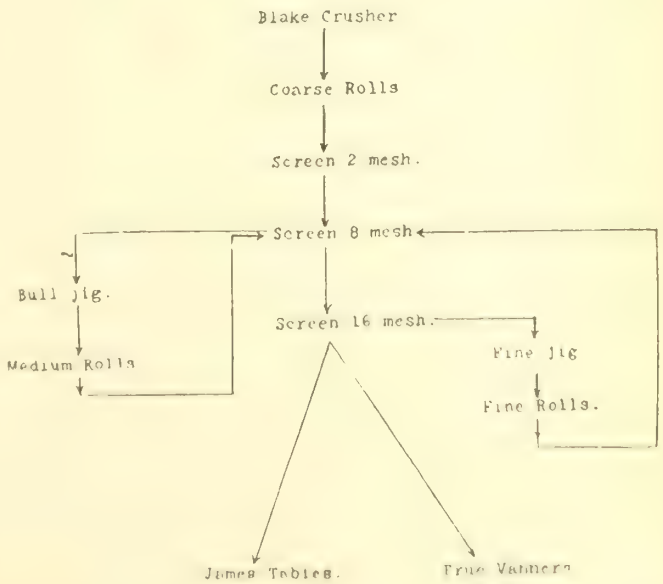
Payments of net proceeds of shipments will be made on the thirtieth day after date of agreement of assays.

Ores assaying 1,500 ounces per ton or over—

These ores will be treated at the Perth Amboy plant by the cupelling process, separately from any other ores, in the presence of the shipper's representative, making payment immediately on production, for all of the silver recovered in silver bars at the New York quotation prevailing on date of production of bars, as given by Messrs. Handy & Harman to Western Union Telegraph Company.

All by-products recovered during the process, such as slags, test bottoms, etc., will be sampled in the presence of the seller's representative, and ninety-eight per cent. of the silver contents of same will be paid for on the basis of assays arrived at by averaging the smelter's results with those of the seller's representative, providing the differences are not unusual; payment being made on the thirtieth day after date of agreement of assay and

(2) COBALT CENTRAL CONCENTRATOR.



at the quotation prevailing on that date; any unusual differences in assays to be adjusted by umpiring in the usual manner.

Working Charge.—$125 per ton of 2,000 pounds of ore dry weight plus one per cent. per ounce of silver paid for.

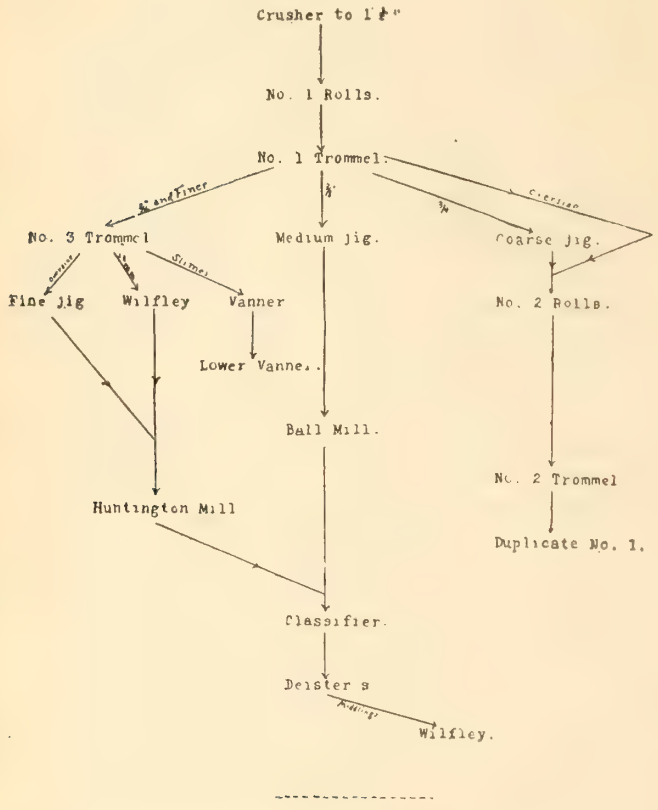
On ores running under 1,500 and above 400 ounces per ton the shipper is advised to consign through Messrs. Ledoux & Company's works at Bergen Junction, with privilege of sampling in transit. At any sampling or other operations at Perth Amboy plant the seller is entitled to have a representative present.

The freight rate on ore from Cobalt to Perth Amboy, N.J., is $10.20 per ton.

Some of the comparatively low grade ores proved suitable for mixing with certain western ores, and for this reason towards the end of the year a considerable tonnage of these ores was shipped to the American Smelting & Refining Company's works at Denver, Colorado. A reduction was made in the smelting charge to offset the increase in freight rates.

The following companies were also occasional buyers of silver-cobalt ores during the year:—

(3) Coniagas Concentrator.



Balbach Smelting & Refining Company, works at Newark, N.J.

United States Smelting, Refining & Mining Company, Chrome, N.J.

Pennsylvania Smelting Company, Carnegie, Pa.

Progress During the Year 1907.

Not only have the old shippers increased their shipments during the year, but the number of shipping mines has been increased by ten, making a total of twenty-nine, and notwithstanding the fact that some of these only shipped small quantities, the increase is noteworthy. It is all the more satisfactory when it is remembered that the shipments for several months were curtailed on account of labor troubles and also that they increased towards the end of the year in the face of a falling price of silver.

The average monthly price of silver in refined ounces in New York is given in the following table, taken from the Engineering and Mining Journal:—

Month.	Average Price.
January	68.673
February	68.835
March	67.519
April	65.462
May	65.981
June	67.090
July	68.144
August	68.745
September	67.792
October	62.435
November	58.677
December	54.565

The average price for the year 1907 was 65.327, the highest price being 70.125 cents on January 3rd, and the lowest 52.5 cents on December 21st.

Most of the mines now have machinery installed and development work can be pushed with greater rapidity. The following table is a fair index of the advance in this line:—

Horse-power boiler capacity of the Cobalt camp at end of

Year.	H.P.
1904	Zero
1905	150
1906	3,406
1907	7,918

The mines of the district now have 74 steam plants and two gas producer plants, and in connection with these are 51 compressor plants, as compared with 20 at the end of 1906.

A favorable result of the installation of this machinery is that more development than formerly is being done per ton of ore shipped, and there is to-day more ore blocked out than there was a year ago.

Concentration.

From the very opening of the Cobalt district it was realized that the problem of treating the low grade ores would form a very important feature in its industrial future. Nearly every mining school and testing laboratory on the continent has run small mill tests on the ore, and from the information thus gathered mills have been designed. There are six mills in the camp, four mine mills being in active operation, and two custom mills nearing completion.

They belong to the following companies:—

Mine Concentrators—

(1) The Buffalo Mines Company, Limited.
(2) Standard Cobalt Mines, Limited (Cobalt Central).
(3) Coniagas Mining Company.
(4) McKinley-Daragh-Savage Mines of Cobalt, Limited.

Custom Concentrators—

(5) Muggley Concentrators, Limited.
(6) Cobalt Concentrators, Limited.

All use water concentration with the exception of the Cobalt Concentrators, Limited, which is installing a penumatic process plant.

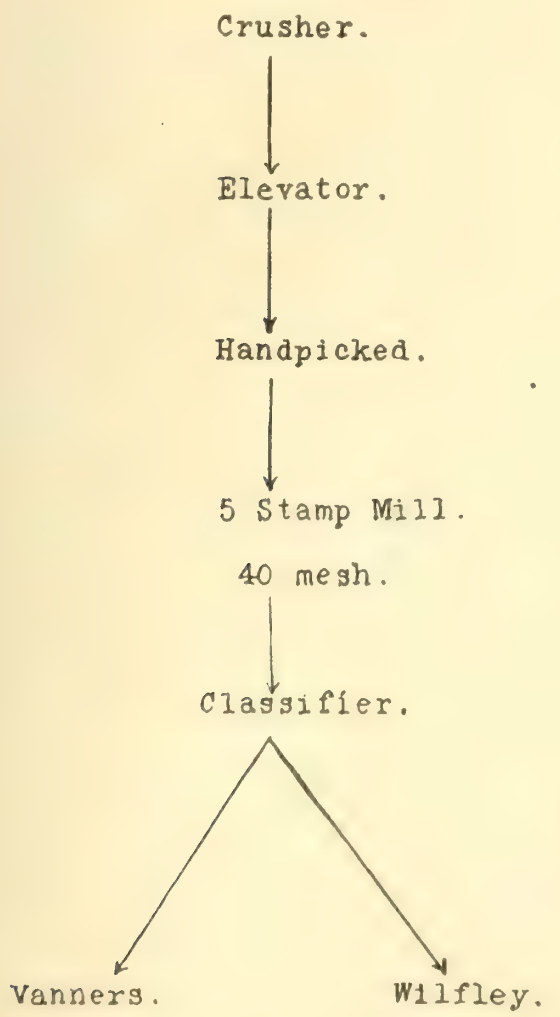
The following flow sheets illustrate in outline the general methods of concentration adopted.

(5) MUGGLEY CONCENTRATORS, LIMITED.

This company has a mill almost ready to start operations and is contracting for ore on a tariff of which the following is an outline:—

On ore yielding 20 to 60 ounces silver per ton, crushed, pay 50 per cent. net silver value.
On ore yielding 60 to 80 ounces silver, per ton, crushed, pay 55 per cent. net silver value.
On ore yielding 80 to 100 ounces silver per ton, crushed, pay 60 per cent. net silver value.
On ore yielding 100 to 125 ounces silver per ton, crushed, pay 65 per cent. net silver value.
On ore yielding 125 to 150 ounces silver per ton, crushed, pay 70 per cent. net silver value.
On ore yielding 150 to 175 ounces silver per ton, crushed, pay 75 per cent. net silver value.

(4) MCKINLEY-DARRAGH CONCENTRATOR.



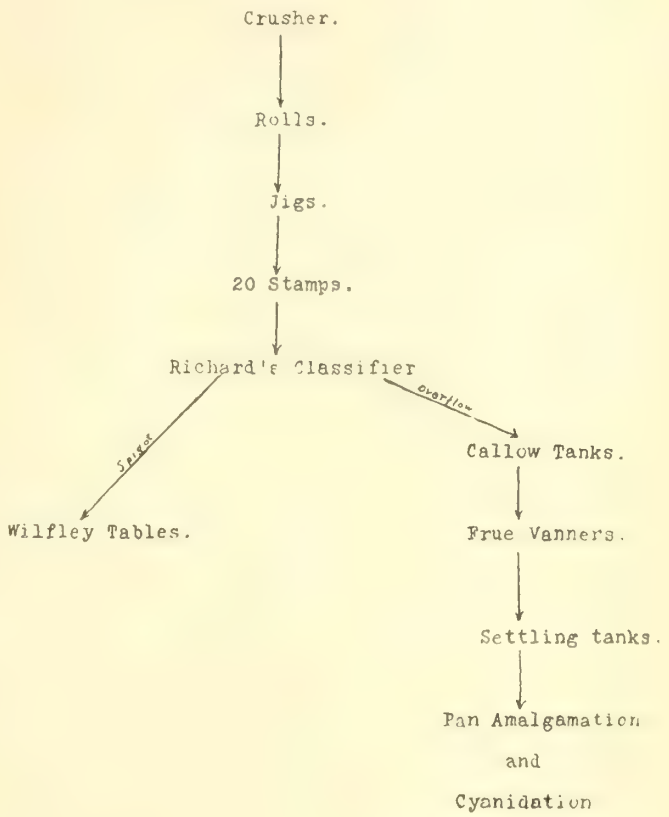
On ore yielding 175 ounces silver and up per ton, crushed, pay 80 per cent. net silver value.

By net silver value is meant the gross silver value less smelting charges.

LEASES.

During 1907 the following mining companies operated on a royalty basis on mineral lands owned and leased by

(5) MUGGLEY CONCENTRATOR.



the Temiskaming & Northern Ontario Railway Commission:—

(1) City of Cobalt Mining Company.
(2) Cobalt Townsite Mining Company.
(3) Nancy Helen Mines, Limited.
(4) Railway Reserve Mines, Limited.
(5) Right of Way Mining Company.
(6) Wright Mining Company.
(7) Jack Pot Silver Mining Company, Limited.

The report is concluded with detailed statements of the equipments and mining operations of the seven companies mentioned above.

In his introductory paragraphs Mr. Cole makes allusion to the rapid and regular growth of mining in Cobalt. The silver production of the camp for 1907 was nearly 5 per cent. of the world's total.

The report should be widely distributed. It is the work of a capable, conservative and painstaking mining engineer.

A NOVEL COUPLING FOR MINE CARS.

(Copied from "Glückauf" 11th March, 1908.)

The coupling arrangement shown in the following cut has been successfully used for some time past in the Minister Achenbach Colliery at Brambauer, near Dortmund, Westphalia. No further details than those shown in the illustrations are necessary to explain the design,

the chief advantage of which is that both coupling members—the shackle and the hook—are together on each side of the car. To couple, the shackle of one car is placed horizontally and the hook is thrown over the circular end of the shackle of the other car. To uncouple the cars it is only necessary to press the hook upwards when both shackles will be released by their own weight. Any accidental uncoupling is impossible because the weight of the shackles in every position presses them together and holds the hook in place. The stronger the pull of the rope also the tighter the connection between the hook and the shackles. It is therefore impossible for uncoupling to occur through sudden bumpings or jolts of the cars, and the numerous breakdowns that occur from this cause are entirely obviated by the use of the arrangement under consideration, and by reason of the tight connection jerking is almost eliminated.

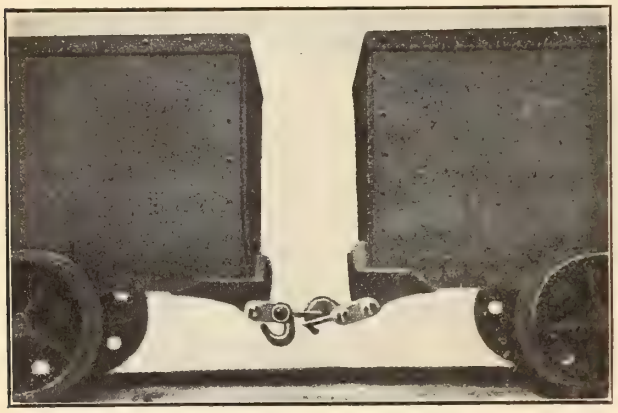


Fig. 1.—Coupling Attachment.

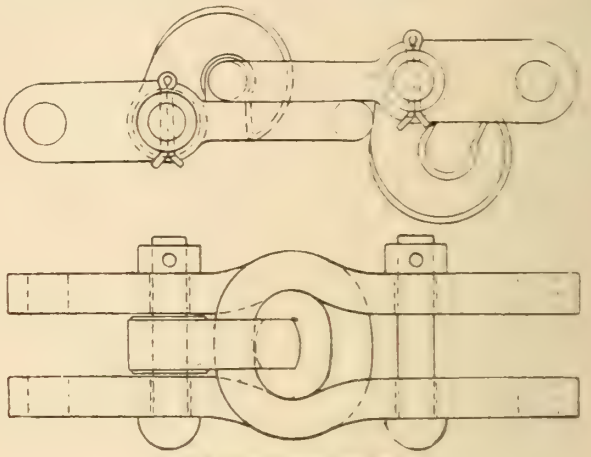


Fig. 2.—Side View and Plan

The coupling is made by the firm of Hugo Klever of Dortmund, and is easily attached to any form of mine car.

F. W. G.

HOW CAN THE GOLD INDUSTRY OF NOVA SCOTIA BE ASSISTED.

By E. Percy Brown, Goldboro, N. S.

(Paper read at Meeting of 25th March, 1908.)

Many of us believe that gold mining in Nova Scotia is about to experience a period of fresh activity on a surer basis than heretofore. We realize that many mistakes have been made in the past, and that the industry has received some bad blows from which it must take some time to fully recover.

I have endeavoured in a few short papers, written during the past year, one for this society and one or two others for The Canadian Mining Journal of Toronto, to set forth what I believe to be the basis of future success in gold mining in this province, namely, the location of "pay shoots" and the following of the same. We have had several instances of the well-defined zones of pay ores extending to considerable depths, examples of which are probably familiar to all, and I contend that in most cases, when rich outcrops have been opened on the surface, that the same continue in depth and their continuations could be followed if proper knowledge were employed.

As to the difficulties in the way of opening up such properties, the chief one consists of the fact that the areas are held by men who will not, or cannot work them, and who do not have to sell them. I believe that right here lies the secret of what is hindering our gold-mining industry more than all other things put together the high price of coal *not* included. I claim that so long without working them, by the payment of the nominal as men are allowed to hold areas for an indefinite time sum of fifty cents an area per year, so long will the mining industry of Nova Scotia be more dead than alive. The measures necessary to correct this may seem harsh. No doubt we would all suffer to a certain extent if a radical change were made in this direction; but I believe that all those who are vitally interested in the welfare of this important industry will see that such a change is necessary.

Why is it, may I ask, that gold mining, struggling as it is, has still to pay a tax on its output? Other kindred industries receive bounties, why not gold? Our coal-mining brethren will claim that they pay a royalty on their product. I ask: who pays this royalty? It appears to me that the gold miners not only pay the 2 per cent royalty on their output, but a full share of the 50 cents per ton on all the coal they use.

If a manufacturing company of any kind proposes to establish a plant anywhere in the province it receives certain privileges, such as a free site, free light, exemption from taxation for a certain number of years, etc. When a gold mining company proposes to start operations, it must first acquire the areas by paying for them probably ten times their actual value, as they lie undeveloped or condemned. The surface rights must be purchased, or the company runs the risk of having to pay excessive damages. When operations are underway they must bear the burden of taxation for the district and hand over to the government the two per cent. tax on their gross output, even if they run themselves into debt to do it.

Can there be any question as to the good that a gold-mining concern, properly conducted, does to a community? We have simply to compare the conditions as they were at any of our well-known mining camps, when in full operations, with what they are to-day when idle. What is more prosperous than the community surrounding an active gold mine? Take for example the settlement that has grown up in the vicinity of the Richardson mine at and near Goldboro, Guysboro county. This mine has been in operation for the past fifteen years, expending from $3,000 to $5,000 per month in the immediate neighborhood. Directly and indirectly the people within 20 miles on each side of this mine have derived great benefit from it, and there are not many manufacturing plants in the province that have benefited the people more than has this mine.

What encouragement has this mine received from the government or from the municipality? The Boston Richardson Company pays a very large proportion of the total school rates for the district; but when it asked that a school house be built close to the mine, so that the miners' children could avoid a walk of over two miles, its request was peremtorily refused. The company then built its own school house and furnished it at a cost of $700, accomodating fifty children that otherwise could not have attended school regularly during the winter months. They got no thanks and instead of a rebate in their school rates got an increase. The Richardson mine has produced, during its existence, almost one million dollars worth of gold, netting a royalty of nearly twenty thousand dollars. The county taxes for the past year amounted to about six hundred dollars.

As another instance of the help afforded a gold mine by the community, may be mentioned the case of a company that expended between one and two hundred thousand dollars in developing a water-power and erecting a plant. Had its operations been successful it would have continued to distribute three or four thousand dollars per month among the community. So grateful were the people near at hand for this expenditure of capital, that they brought suit against the company, claiming that it would ruin the trout fishing on their river.

It seems to be the general impression that gold mining machinery is admitted free of duty; but I have carefully studied the tariff and can find no material or machinery admitted free, except copper plates and automatic feeders, that is likely to be of any great use to the gold mining industry. Automatic ore samplers are on the free list; but I very much doubt if we will ever need to import one. Bullion furnaces are not likely to be imported, and when we have arrived at a stage when we need to import mercury pumps, amalgam cleaners and amalgam safes, we will probobly be quite willing and able to pay duty. Why this discrimination?

I know of one case where a gentleman was importing a set of assay balances valued at $150.00. He asked that they be admitted free of duty as they were for a cyanide plant. His application was refused by the department as it was stated that balances might be used for other purposes than those mentioned,—for use in a grocery store, for instance.

The government of this province has passed an act to encourage gold mining in Nove Scotia by assisting in the sinking of vertical shafts. I do not know of a single district where such a shaft will develop to best advantage the zones of pay-ore. Where this method has been tried it has resulted in a failure. The reason for this is that where zones of pay-ore are found they usually pitch at low angles, ten to thirty-five degrees in the strike of the vein, and a vertical shaft rapidly leaves them, making proper development impossible, or, at the best, very expensive. A system of cross-cutting has been suggested, but while I can see how this would prospect the ore-bodies, I cannot see how it would develop them.

I hold that the only proper way to develop the shoots of rich ore, which we know to exist in this province, is by getting in touch with the pay-ore and keeping in touch with it, probably by means of an inclined shaft.

The above points have been merely stated as they occur to me, and I am open to correction on any one or all of them; but what I do ask is that a committee of active gold mining men of this society be formed to consider these points which may be summarized as follows:

1. To collect data relative to the existence of well-defined pay-shoots in Nova Scotia.
2. To confer with the government regarding the holding of areas by people who will not work them.
3. To confer with the government regarding the abolition of the 2 per cent. royalty.
4. To consider the tariff in so far as it relates to gold mining machinery and supplies, and to determine if a revision be possible.
5. To confer with the government regarding an amendment to the present act concerning the assistance to be given to the sinking of vertical shafts, so that it may apply to the sinking of any shaft, vertical or otherwise.
6. To determine what other steps can be taken to encourage the gold mining industry of the province.

The success which has attended the efforts of this society to establish a system of technical education in Nova Scotia shows what can be accomplished when the proper steps are taken, and I believe that the above committee could be as fully successful in its undertaking.

In closing, I beg to suggest that Mr. E. R. Fairibault be a member of this committee.

ROCK DRILLS USED IN COBALT.

The tabulated list of power and drill equipments of Cobalt district, recently published in THE CANADIAN MINING JOURNAL, was as correct as could then be obtained. We are indebted to Mr. A. A. Cole, mining engineer of the T. & N. O. Railway, for the following corrected statement of the number and makes of drills:

Percussion—	
Ingersoll	56
Mac	73
McKernon	9
Rand	203
Sullivan	4
Total	345
Air Hammer	
Hardsoeg	2
Murphy	13
Shaw	1
Sullivan	2
Waugh	3
Total	21

As will be noted by comparing this with the former list, there are a few changes. Any person who has attempted to gather exact information of this nature will realize how difficult it is to obtain. It may be added that such information is of positive value.

THE MECHANICAL EQUIPMENT OF THE OTTAWA MINT.

(A paper read before the Mechanical Section of the Canadian Society of Civil Engineers.)

(*Continued from April 1 Issue.*)

Rolling.—When designing these mills arrangements were made to provide for extremely accurate and very fine adjustments for the rolls, for all the driving mechanism to be kept above the floor level (the ground being rock, and very hard to excavate) and for economy of floor space.

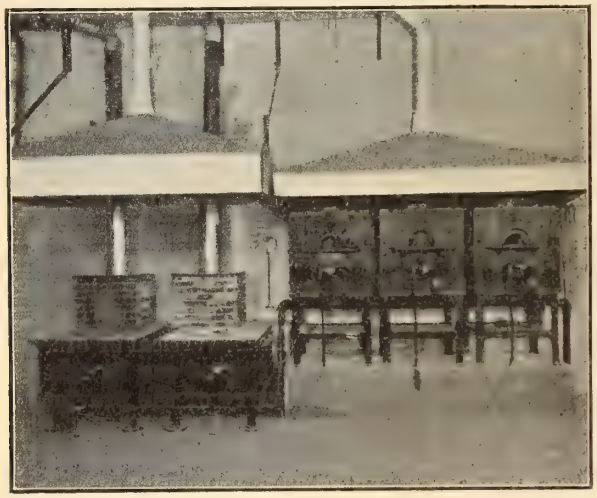


Fig. 6.—Cupel and melting furnaces in Assay Department.

Each mill is driven by its own motor, through gearing; the general arrangement being as follows:—

The motor, gearing and roll housings are all on one bedplate, thus ensuring rigidity and perfect alignment. The first motion shaft carrying the driving pinion runs

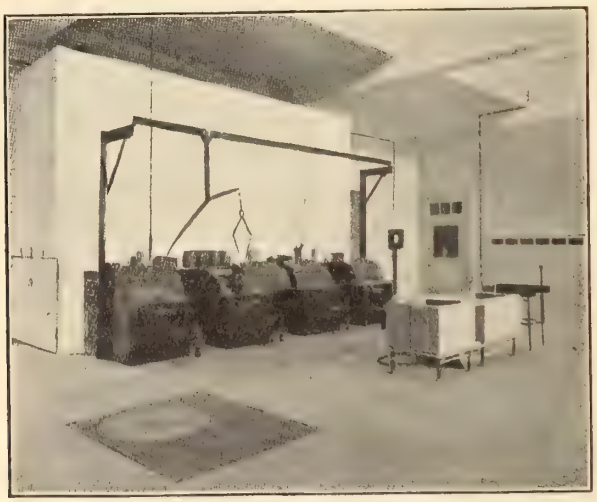


Fig. 7.—Melting furnaces, condensing chamber, acid and water tanks in Melting House. The granulating tank is situated under the iron plating shown at the left of the foreground, and is fitted with water supply, over-flow and waste pipes, and settling tank.

in its own bearings and, at one end, is connected with the motor through a flange coupling outside one of the bearings, so that the motor is entirely free from any thrust. At the other end of this shaft, outside the other bearing, a small fly wheel is keyed. The second motion shaft gears with the shaft driving the bottom roll, and this latter shaft gear through double helical gearing with the shaft which drives the top roll.

The rolls are conected with the gearing by means of breaking spindles and muff couplings. The couplings are held up to their work by adjustable wood distance pieces.

The motors run at 600 revolutions per minute, and the rolls at from 40 revolutions per minute, for the breaking down mill, to 60 revolutions per minute for the finishing mill.

The form of drive described above is found to be very convenient, and to absorb very little power.

The breaking down mill is driven by a 30 H. P. motor, fitted with an overload release, which is set to cut out at 50 per cent. overload. The distance between the rolls is regulated by means of worms and worm wheels actuating large, single, square thread screws of 1-2 inch pitch. There are 50 teeth in each worm wheel. The worm shaft is divided in the centre, the halves being conected by means of a friction coupling, so that when it is neces-



Fig. 8.—Shearing machine, rotary gas and assay crusher in Melting House.

sary to "parallel" the rolls, one end only of the top roll may be moved at a time. This worm shaft is actuated by hand wheels at either end, one complete revolution of which closes or opens the rolls .01 inch. The hand and worm wheels are fitted with indicators and divided circles, so that adjustment of the rolls can be made as fine as .0005 inch. For ordinary rolling it is usual to work to .001 inch at this mill.

It has been found difficult, with the form of adjustment detailed above, to prevent the top roll from jumping, when the bar which is being reduced first enters between the rolls. This jump may arise from the three following causes:—

(1) There may be slackness between the roll journals and bearings.

(2) There may be looseness in the attachments between the bottoms of the big screws and the caps of the roll bearings.

(3) There may be wear between the big screws and the threads of the nuts in the roll housings.

When it is remembered that the weight of the top roll with its brasses and adjusting gear amounts to about two tons, it can be readily imagined that signs of wear will soon become apparent between these nuts and screws.

Various devices have been tried with a view to prevent this jumping of the top roll; a common one being that of heavy weights, situated in a tunnel below the floor level, which act through levers and rods to counterbalance the weight of the top roll and gearing. This method, however, does not entirely overcome the difficulty.

In order to avoid excavating for a tunnel, the following arrangement has in this case been adopted, and there is every reason to hope that it will be entirely successful in preventing the jump of the rool.

The top of each roll housing has been extended on one side so as to form a hollow casing in which a powerful buffer spring is situated. Each spring is of sufficient strength to take, when half compressed, the entire weight of the top roll with its brasses and adjusting gear.

When the top roll is depressed to within one inch of the bottom one, these springs come into full play, and thus keep the big screws, which actuate the top roll in close contact with the upper side of the threads in the nuts. There is thus no weight on the bar that is being

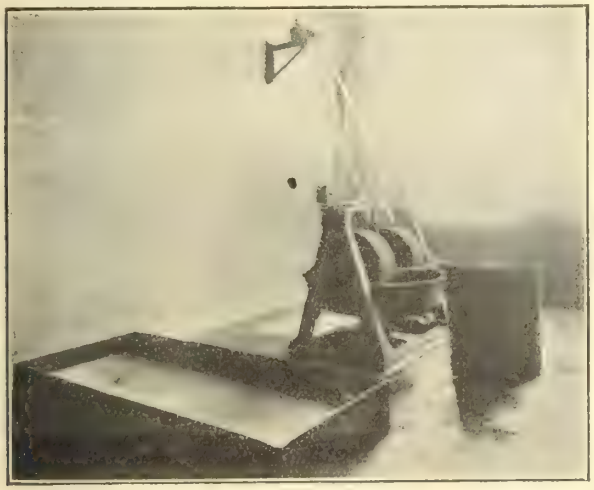


Fig. 9—Mortar mill for reducing worn-out crucibles, etc., for the recovery of precious metal.

rolled other than the intentional pinch given to it through the gearing.

This arrangement has been thoroughly tested and, up to the present, the top roll has shown no sign of jumping. The bars so rolled into "fillets" have been carefully gauged and found to be remarkably uniform throughout their entire length.

The rolls in this mill are 14 inches in diameter and 16 inches in length, and are driven at 49 revolutions per minute.

The thinning mill is driven by a 20 H. P. motor in the same manner as the breaking down mill. The adjustment of the rolls is also the same, but the gearing, etc., is, of course, of somewhat lighter construction.

The rolls in this mill are 12 inches in diameter and 14 inches in length, and are driven at 50 revolutions per minute.

The finishing mill is driven by a 10 H. P. motor in the same manner as the others; but the adjustment of the rolls is different. This distance between the rolls is varied by raising or lowering the bottom roll by means of long steel wedges, which are actuated by a hand wheel through gear wheels and fine screws . The hand and gear wheels are fitted with indicators and divided circles, so that adjustment of the rolls can be made as fine as .0002 inch.



Fig. 10.—Rolling mills. Fillet-annealing furnace on right.

The rolls in this mill are 10 inches in diameter and 12 inches in length, and are driven at 60 revolutions per minute.

The bars from the Melting Department are first passed 10 or 12 times through the breaking down mill, after which they are annealed in the fillet annealing furnace. They are then passed 8 or 10 times through the thinning mill and 5 or 6 times through the finishing mill, when they should be the correct thickness for the coin that is to be made. For silver and bronze coins, rolling is sufficiently accurate; but for gold, further treatment is necessary. This latter metal is very dense, having a specific gravity of about 19, as against about 10 for silver and about 9 for bronze. The variation alolwed by law from a standard weight is also, in the case of gold coins,



Fig. 11—Breaking down mill and fillet annealing furnace.

very small. For instance, the standard weight of a British sovereign is 123.274 grains, but the remedy allowance is only .2 grain. If the coin exceed this limit, by even so little as .01 grain, it is rejected, and re-melted. The remedy allowance on silver coins is much more gen-

erous, weight for weight; being between two and three times as great as for gold.

The fillet annealing furnace is heated by oil fuel mixed with steam at 60 pounds pressure per square inch. The floor of the heating chamber is composed of three endless chains, travelling side by side, and driven by sprocket

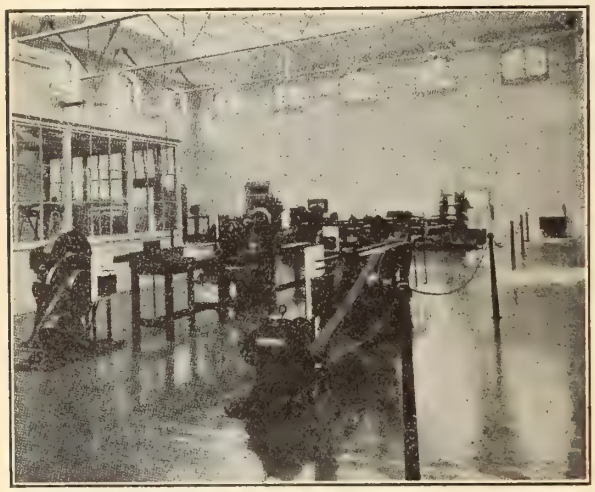


Fig. 12.—General view of Rolling and Adjusting Room, showing draw-bench, automatic trying cutter, and scale room.

wheels situated at either end of the chamber. The speed at which the chains travel can be varied by means of a speed box attached to the driving motor; so that the time occupied by a fillet in passing through the furnace may be from 4 to 12 minutes. The fillets are laid flat on the travelling chain, 5 or 6 side by side, and as they emerge, pass through a sheet of water; so that they are cooled before they come into contact with the air. This arrangement prevents oxidation, and very little, if any, discoloration is noticeable.

Adjusting.—In the case of silver and bronze, the fillets pass from the finishing mill to the blank cutting machines; but, in the case of gold, as before stated, it

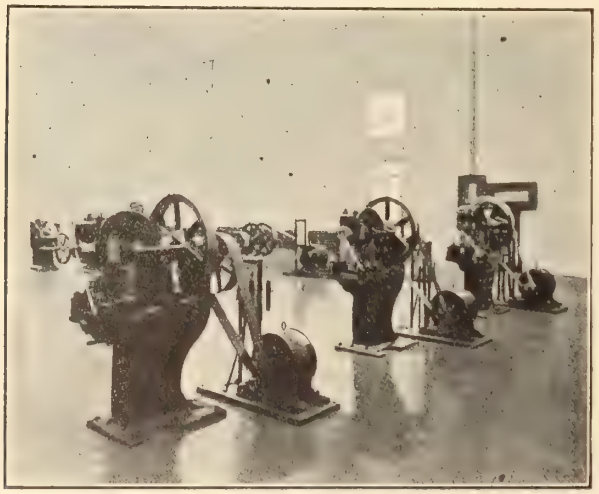


Fig. 13.—Cutting-out machines.

is found that further adjustment is necessary. The gold fillets are accordingly taken to the drawbench, where they are drawn between two fixed steel cylinders by means of a dog-clutch, which engages with an endless chain. These cylinders are about 4 1-2 inches long and 3-4 inch in diameter; they are highly polished, and extremely hard, and the distance between them can be adjusted to .0001 inch. By this means the small inequalities in the thickness of the fillets are regulated, and their variation from standard is reduced to a minimum. The fillets then pass to the blank cutting machines.

Cutting.—There are three of these machines, each one driven by a separate motor, and capable of cutting blanks for all sizes of coins, at the rate of 300 per minute. The punches and beds for all the different denominations are interchangeable, so that little time is occupied in changing from one to another. Each machine is fitted with an automatic variable feed, which can be increased or decreased by multiples of .05 inch.

After the blanks have been cut from the fillets, the skeletons that are left (technically known as "scissel") are cut up into convenient lengths, and made up into bundles for re-melting.

Marking.—The blanks are next taken to the marking machine, where raised edges are formed round their circumferences. These raised edges protect the impressions, which will be given to them later in the coining presses, and thus prevent their being rapidly worn

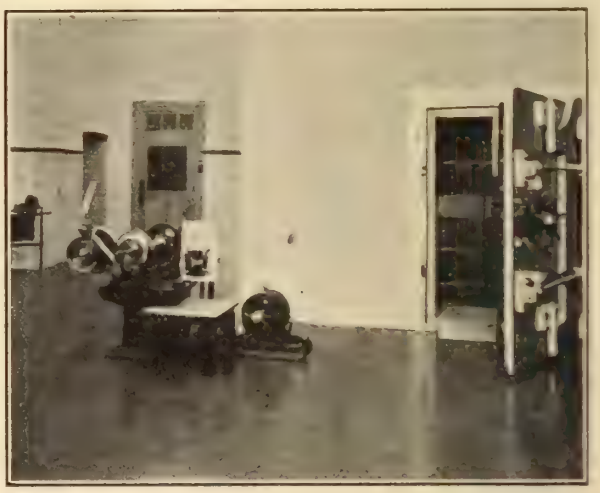


Fig. 14.—Marking machine and stronghold door.

away. This machine is capable of making 600 blanks per minute. The blanks pass between a circumferential groove, in a rapidly revolving hard steel disc, and another groove, struck from the same radius, in a fixed hard steel block. The distance between the disc and the block can be varied, so that any size of blank may pass between them. The blanks are then annealed, and thoroughly cleaned.

(To be continued.)

ALLOYS.

This is the age of alloys. Special research is constantly revealing unsuspected valuable qualities in new combinations of metals. Nickel steel, chrome steel and other high grade steel alloys have revolutionized the manufacture and use of structural material. The speed and durability of the modern motor car would have been unattainable had not special steel alloys been introduced. Foundry practice and machinery construction have been profoundly modified and improved by the intelligent use of alloys.

These considerations lend interest to a booklet issued by Geo. G. Blackwell Son s& Company, Limited, of Liverpool, Eng. This firm holds contracts with the British and many foreign governments. It specializes in alloys and metals. Under its control is the largest electric furnace works in the world, where a maximum of 42,000 horse-power is utilized. The firm also owns and operates its own mines. From the booklet a few facts may be quoted.

Chromium.—Ferro-chromium is used for armour plates, projectiles, wire, high speed steel, stamp shoes, and dies, tires and axles, etc. Its high percentage of chromium and its uniformity determine the value of an alloy. One brand made by the Blackwell Company shows the following analysis:

	Per cent.
Chromium	66.448
Iron	21.90
Carbon	8.800
Silicon	1.353
Manganese	Trace.
Phosphorus	0.053
Sulphur	0.045
Loss and undetermined	1.311
	100.000

As a contrast to this, and constituting in itself a metallurgical triumph, another variety of the same brand shows 69.30 per cent. chromium and only 1.47 per cent. carbon; and another 63.586 chromium and 0.65 carbon.

For making high class steels containing fixed percentages of chromium and nickel, a chrome nickel iron alloy is supplied. Its analyses is as follows: C, 52; Ni, 18; Fe, 28.96; C, 0.50; Si, 0.50; S, 0.03; P, 0.01. The low carbon is a most important feature of this and similar alloys.

Tungsten alloys, which are replacing tungsten metal powder, range from 85.79 to 65.70 per cent. tungsten, and from 0.60 per cent. carbon to 2.92 per cent.

Molybdenum is fast becoming recognized as one of the most valuable constituents of a steel alloy. It increases the elongation and elastic limit of steel. In this respect it is much more valuable than nickel. An addition of 0.25 per cent. of molybdenum increases elongation from 4 per cent. up to 45 per cent. This gives it great value in the manufacture of large crank and propeller shafts. Its introduction into boiler plates for high pressure boilers has made possible the use of lighter plates that are actually stronger than much heavier plates made without the alloy. For motor car forgings and castings molybdenum steel is specially adapted. In high speed tools it gives all the desirable qualities with carbon kept below 1 per cent.

Ferro-molybdenum ranges in composition from 85 per cent. to 50 per cent. molybdenum and from 3.07 to 0.35 per cent. carbon.

NOTES ON FUEL ECONOMY AND ITS APPLICATION TO NOVA SCOTIA.

By A. A. Hayward, Halifax.

(Read before the Mining Society of Nova Scotia, 25th March, 1908.)

Of late there has been abroad a spirit of dissatisfaction and unrest, one that has developed into a strong desire for something commercially better, an increasing desire for a larger share of continental prosperity, a hope that fate might drift the golden barge of prosperity near our shore, so that we might secure more of its precious cargo. There are those whose personal desires and patriotic dispositions have lifted them above political and party degeneracy, and by such this manifestation has been termed the "forward movement." For these and such others as are desirous of dipping deeper into industrial questions, I have prepared the following remarks:

Do we deserve to become commercially strong? If so, it is absolutely necessary that we select for our foundation naturally existing materials or conditions, and not those created by party force or individual craft. Natural conditions are created, not made. They constitute our natural resources, such as raw material, water power, fuel deposits, etc. If we are wise, and above all sincere, in our industrial and commercial aspirations, we will seriously investigate these conditions if we desire to build wisely.

It is sometimes said we are an extravagant and wasteful generation, and that through our mechanical and commercial recklessness we are securing but a sup from the horn of plenty and throwing aside the remainder of its contents. Behind us we leave a trail of neglected opportunities and wasted natural resources. As we run over the facts before us, the mass of accumulated evidence seems interspersed with instances of our supreme ignorance of natural conditions, as well as our neglect in applying the knowledge already in our possession. The only defence we offer for our course is that it is the result of the exigencies of competition and increased dividends on the production and distribution of the products of our raw materials. We are regardless of the moral and natural rights of the consumer, from whose birthright we are securing but a fractional part of the values contained therein. It does not require a close observation of events to see that we are selecting from our industrial tree only such fruit as is within easy reach, and from which we can, for the moment, secure the largest margin of profit.

Such in part are some of the regrettable facts conspicuously evident in a survey of this subject, conditions which justify the consumer in demanding an equitable share in the distribution of his inherited rights. Such an equitable distribution does not contemplate the securing a smaller percentage of the fruit of the industrial tree with the loss of the remainder, but the harvesting and marketing of a larger percentage, to the better advantage of both producer and consumer. If we are to enjoy the fullness of commercial prosperity, the ox should not be sacrificed for the hide and tallow alone.

During our mad rush for dividends and commercial supremacy, we have overlooked one of the most important of all fundamental facts, that is, that to mankind

in general belongs the natural raw material, and that while we have, by civil enactment, vested it in the hands of individuals, as custodians, it is incumbent upon the producer to secure and distribute the finished product to the consumer by the most direct means, and at the lowest possible cost. It is also incumbent upon the producer to recover, as far as possible, all the marketable commodities contained in the raw material, in order that he may cheapen the cost of the whole. It should also be his duty to protect the finished product from the commercial parasites that infest the highway from the point of production to that of consumption, by adopting as his trade-mark, "One common inheritance, one profit."

Does not the mal-practice with which we continue to manipulate the energy stored up in our great coal deposits furnish abundant evidence of the slowness with which we grasp the importance of more practical and economical applications of later-day mechanical devices and commercial methods. That we may more intelligently present our case, a single subject will serve to illustrate, and a specialization of the evidence will greatly assist in arranging our final conclusions. For convenience let us select as a representative subject, one familiar to all, namely, coal.

Nature has stored up in its coal deposits enormous energy, which we are rapidly consuming. In spite of the vastness of these fuel deposits there are those who recognize that materials containing such vital energy must be economized. We are not so rich that we can disregard the necessity for economy, and continue wasting what nature has so generously donated. Authorities all confirm the opinion that in the burning of coal by our present mechanical devices, we are wasting nine-tenths of the heat energy stored up in these fuel deposists. There are some who venture to predict the discovery of new sources of energy when these have been exhausted. The future is an unknown quantity and should not concern us at this time.

The question of economical generation of power and heat from fuel is the most serious and important one of this mechanical age; while its centralization and distribution require careful mechanical and commercial consideration.

Anyone sufficiently interested to follow the history of a ton of coal will see it mined at one profit, transported at another, handled and re-handled at an additional cost, and to this must be added the profit of the middleman, and he is forced to admit that all these various charges have been paid on at least 12 per cent. of ashes and stone contained in the coal. This picture of unnatural conditions must be sufficient to convince any student of economy that radical changes are absolutely necessary in our methods of production, transportation and distribution of our fuel product. It is estimated that forty per cent. of the fuel product mined is used for domestic purposes, and yet by the most improved methods of heat generation we have not succeeded in securing and turning into use 5 per cent. of its thermal efficiency. While from the balance, 60 p.c., if converted into power and light through the external combusion and steam engine, we have obtained remarkable results if we have secured 14 per cent.

A good average steam plant succeeds in securing and delivering at the engine shaft in useful energy from 6 to 8 per cent., while a modern compound condensing engine, working under favorable conditions and in large units of from 1,000 to 2,000 horse-power, may deliver in useful power from 12 to 14 per cent., thus sustaining an actual loss of from 86 to 94 per cent. of thermal energy contained in the fuel. Owing to the intensity in temperature of the superheated steam used in the modern high-power engine, the limit of its economic development seems to be nearly reached.

A series of tests made with steam engines in 1906 showed that the very lowest consumption of coal with the most improved steam plant was 1.03 per 1 horse-power hour, while five express locomotives consumed 3.16 pounds. The average consumption was placed at 5 pounds, although there were some that showed a consumption of 36 pounds per 1 horse-power hour.

Tests made of steam plants by the Automatic Gas Producing Company of New York gave the following results, and show the yearly cost to maintain 1 horse-power by the use of steam engine and boiler:—

Coal at $3 per ton, using 3 pounds per hour, $1,570 per horse-power year.
Coal at $3.50 per ton, using 8 pounds per hour, $4.200 per horse-power year.
Coal at $5 per ton, using 3 pounds per hour, $2,250 per horse-power year.
Coal at $5 per ton, using 8 pounds per hour, $6,000 per horse-power year.
Coal at $4 per ton, using 3 pounds per hour, $3,000 per horse-power year.
Coal at $4 per ton, using 8 pounds per hour, $4,800 per horse-power year.

It is not the purpose of this paper to describe in detail the gas producer and engine nor its mechanical operations, but rather by its well-recorded economical achievements to illustrate by contrast the opportunities that apparently await more energetic recognition.

European engineers have for some years recognized the pressing necessity for economy, and no scientific introduction is meeting with more approval from the engineering fraternity than the gasification of fuel and its application for heat, power and light through the internal combustion engine. German engineers long since recognized the economic and mechanical advantage of using gasified fuel as a motive force. England is partially awake, while American engineers, although somewhat behind, have begun to appreciate the merits of higher thermal heat as a means of developing power and light. European engineers and the public regard this principle with the same degree of confidence. Both large and small plants are in evidence everywhere. Large central stations, aggregating several thousand horse-power, are numerous, especially where economy is essential.

The use of gas for engineering purposes has greatly increased during the past few years, and to-day it is considered one of the most important means of generating power. Notwithstanding that other systems have been devised for power and light, fifteen million tons of coal are annually converted into gas.

It is well known that the efficiency of the internal combustion engine far exceeds that of the external. This economic efficiency is largely due to the constant improvements that have been and are still being made in both the producer and engine. Tramways and power stations are now being equipped with gas plants of large units, and builders are prepared to guarantee the performance of both producers and engines.

In Germany there are already installed 203 gas plants which have a total effective power of 184,000 horse-

power, while there are under construction and erection 146 engines which will develop 201,000 horse-power, making altogether 349 engines having a total power of 385,000 horse-power. Between the months of March and July there were ordered 31 engines, combining 36,150 horse-power. Of this total, 18,950 horse-power is to be used for generating electricity. Altogether in Germany there are 199 engines, combining 206 horse-power, that are being used for electrical purposes, the largest horse-power in any one plant being 35,000 effective horse-power. In 16 collieries there are in operation 35 gas engines, having 30,300 effective horse-power and most of these engines are used for generating electricity.

Large gas engines are gradually coming into use in England. The following figures will serve to illustrate the confidence English engineers have in the economic and satisfactory mechanical performance of producer gas plants. There were during the year 1906, 91 plants in operation, having 70,685 effective horse-power. None of these plants developed less than 500 horse-power. Six plants developing 3,660 horse-power received their supply of gas from blast furnaces. Four engines developing 2,300 horse-power were supplied from coke ovens. The balance, 62,019 horse-power, received their supply direct from gas producers. Coupled to many of the larger units are by-product recovery plants, for the saving of ammonium sulphate.

At Philadelphia, near Sunderland, there is a plant for supplying gas to an electric generating station, which in turn supplies current for the Sunderland tramway system. This plant is located at the pit mouth. At Park Head, Glasgow, Messrs. Beardmore & Company are operating a 20,000 horse-power plant. At Dalmire there is a plant generating 10,000 horse-power, 4,800 horse-power of which is used for generating electricity. At South Staffordshire, England, the Mond Gas Company has secured Parliamentary powers to supply Mond gas over an area of 120 square miles, distributing the same through pipe lines for heating and power, at a cost to large consumers of 4 cents per 1,000 cubic feet, and has installed a plant of 25,000 horse-power, consuming 250 tons slack per day. Messrs. Beardmore & Company have built and are building producers of 100,000 horse-power capacity, all of which clean the gas, and recover, as a by-product, sulphate of ammonia in sufficient quantities to pay the entire original cost of the coal. The Cargo Fleet Iron Company, Middleborough, have installed 24,000 horse-power with an ammonia recovery plant attached. Messrs. J. Brown & Company, Clydebank, have an 8,000 horse-power also with an ammonia recovery plant. A plan has been proposed for supplying the city of London with Mond gas from a plant to be located in the South Yorkshire coal fields. This will require a pipe line 25 inches in diameter and 175 miles in length. To assist transmission, the gas will be compressed to 500 pounds in compressors of 46,000 horse-power. It is estimated the cost of the gas delivered in the holders will be 15 cents per thousand cubic feet.

While electricity in Europe has replaced gas as an illuminant, the demand for coal has continued to increase. In addition to that necessary in generating electricity, the demand for gas for power purposes has increased faster than illuminating gas has been replaced by electricity.

In illumination fifty per cent. more illuminating power can be secured by converting gas into electrical energy than by burning the same in an ordinary gas burner. The ordinary gas burner only gives about 3 candles per cubic foot of 16 candle power standard quality gas per hour, while the modern gas engine coupled to a dynamo supplies one electrical horse-power on 19.8 cubic feet of illuminating gas at the rate of 26.5 cubic feet of gas consumed per kilowatt hour, giving off in electrical illumination 266 candlepower hours, equalling nearly four times the illuminating effect of the same gas burned in the ordinary flat gas burner, or equal to 10 candle power hours per cubic foot of gas burned.

(To be continued)

LOVE AND PETROGRAPHY.

Lines suggested by a conversation with the Petrographer of the Geological Survey, who was examining rock slides.

Visitor: "Come, throw those wretched slides away
and give ourselves to other thoughts,
Let's seize upon this summer's day
To drink the cup of joy in
Petrographer: Quartz.

Visitor: "Has life no other aim but this?
Discard your work—there's time enough!
Let's seek for love—and, seeking, kiss
The maiden when we find her
Petrographer: Tuff.

Visitor: "Holds love no joy for such as you?
Your rocks of stone! your heart of ice!
What if a loyal heart and true
Should prove some day that love is
Petrographer: Gneiss.

Visitor: "Let others prate of wealth, and might
Of conquering heroes, power and place—
Than die a nobleman to-night
I'd sooner live to
Petrographer: Diabase.

—F. J. N.

Economic Geology, March-April, 1908.—In a paper entitled "A Practical Classification for Low Grade Coals," Marius R. Campbell brings out these points:—

(1) The recognition of two classes of coal below the grade of bituminous.

(2) The restriction of the name "lignite" to the lower grade, and the application of the name "sub-bituminous" to the higher grade, in conformity with the usage of the United States Geological Survey.

(3) The recognition of weathering as the criterion for separating the sub-bituminous from the bituminous grade of coal.

(4) Manner of weathering divided into two classes: (a) Irregular breaking in sub-bituminous coal as opposed to cleaving into prisms in bituminous coal, and (b) separation along bedding planes into plates in sub-bituminous coal.

(5) Separation of lignites from sub-bituminous coal on the basis of color, the former being brown and the latter black.

INDUSTRIAL PAGE.

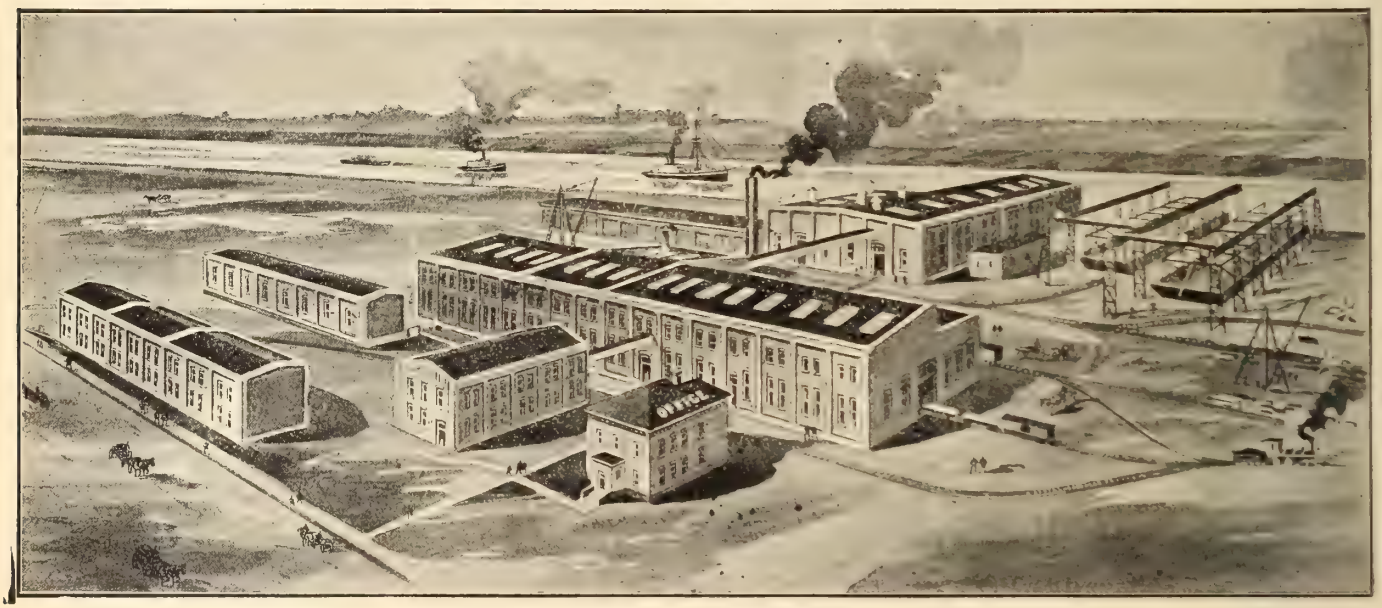
A LARGE CANADIAN PLANT.

Almost exactly a year has elapsed since M. Beatty & Sons moved into their new factories and offices on Muir street, Welland, Ont.

Founded in what was then the village of Welland, in the year 1862, by the late Matthew Beatty, of Londonderry, Ireland, the concern is now one of the most progressive in Canada. Its superbly equipped plant occupies a frontage of 1,100 feet on the canal. The various buildings are of the most modern type of steel and concrete construction. The plant and yards cover fifteen acres.

The first complete dredge ever constructed in Ontario was built by M. Beatty & Sons. As manufacturers of contractors' supplies, the firm's reputation is unique. Their products include dredges, derricks, steam shovels and hoists. These are adapted to the needs and requirements of Canadian conditions. The firm's long experience has enabled them to turn out machinery that is unsurpassed in strength and fitness.

Main Building.—This structure is 80 x 324 feet, is built of concrete and steel and contains the machine shop, casting room, store room, core room and cupola room. In the machine shop, 80 x 160 and one storey high, the erecting department occupies the east side. A fifteen ton Niles travelling crane runs the entire length of the shop. The shop is equipped with a large boring mill, radial drill, cold saw, horizontal boring machine, etc. The crane and eleven large machines are driven by individual



PLANT OF M. BEATTY & SONS, WELLAND, ONT.



MACHINE SHOP OF M. BEATTY & SONS, WELLAND, ONT.

variable speed electric motors. On the west side of the shop, where the light machinery is assembled and erected, a jib crane on overhead tracks does all the handling, and a forty horse-power motor drives the machinery. A standard gauge railway runs through the centre of the building.

The foundry store department is two storeys in height. In the lower storey castings are stored; in the upper storey the heating apparatus is installed and the finished parts are stored.

The foundry department, 100 x 80 feet and one storey high, includes two ten ton Nile cranes with individual motors, a Colleau cupola of five tons per hour capacity, a fan driven by a 30 horse-power individual motor, and two Kinnear patent core ovens heated by natural gas.

Boiler Shop.—This one storey building, constructed of concrete and steel, is 50 x 101 feet. Boilers are made here and all materials for the steel hulls of boats and dredges. Two five ton travelling cranes are used here. The building is fully equipped with shears, punching machine, heavy boiler rolls and a radial drill.

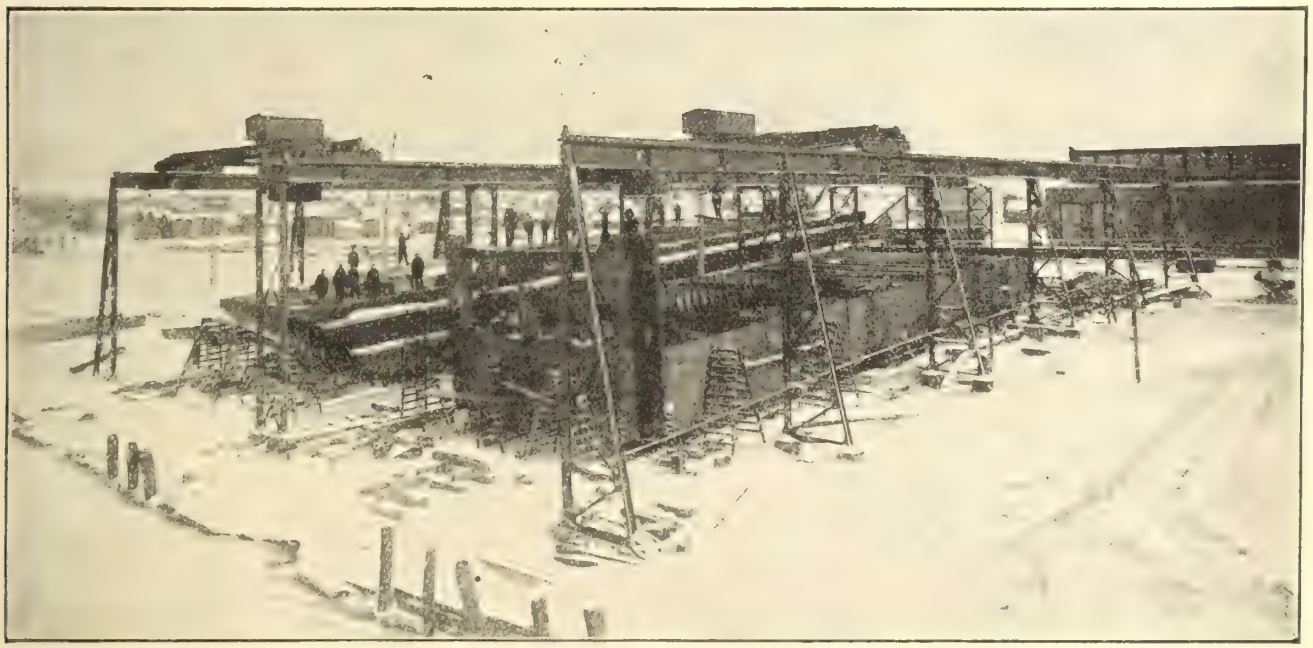
Pattern Store House.—Of concrete and steel, two storeys high, 42 x 144, built in three compartments with concrete fire walls.

Office.—The office, also, is concrete and steel. The building measures 36 x 50 feet, is two storeys high and is finished inside in Georgia pine. Downstairs there are five offices; upstairs, two draughting rooms. On each floor there is a fireproof vault.

Machinery Store House.—Concrete and steel, 36 x 144, one storey.

Power House and Power Equipment. — The power house is a one storey building, 32 x 72 feet, concrete and steel. The roof is also of these materials. For heating purposes a 130 horse-power boiler is installed here. Two air compressors, one with a capacity of 341 cubic feet of free air per minute at 160 revolutions and the other with a capacity of 251 cubic feet are to be seen here.

Power is received from the Cataract Power Company at a voltage of 2,200, and is transformed down to a working pressure of 220 volts.



SHIPYARD OF M. BEATTY & SONS, WELLAND, ONT.

Shipyard.—The shipyard is situated on the bank of the canal at the north end of the boiler shop. At the launching slip two steel towers are erected, 35 feet high, 160 feet long, with a span of 50 feet. One ten ton Shaw travelling crane handles the material. A subsidiary crane handles material from the cars to the launching slip. Compressed air is used for caulking and riveting.

Blacksmith Shop.—The building is 51 x 61 feet, one storey, concrete and steel. Six forges are operated. Each has an improved adjustable hood and an 80 inch fan to carry off smoke. Other features are one 1,100 pound steam hammer, one 250 pounds Beaudry hammer, four three ton jib cranes, and one crane outside the shop.

Carpenter Shop and Patternmakers' Shop.—This is a two storey building of concrete and steel, measuring 42 x 82. In it are a dry kiln 22 x 24 and a vault for storing shavings, 6 x 24. The shavings from each machine are removed by an exhaust fan and deposited in the vault. All patterns are made here.

Both alternating and direct currents are used throughout the different departments.

Compressed air is used in all the departments for chipping, riveting, drilling, boring, etc.

There are eight or ten other buildings, not including lumber shed. All the large buildings are so constructed as to be easily enlarged as business may warrant.

B. F. Sturtevant & Company's heating system is used. Ventilation is perfect. Each department is provided with modern sanitary lavatories.

On the company's ground are 3,300 feet of standard gauge railway, and 3,000 feet of industrial railway.

Catalogue No. 2 of the Triplex Rolls Company has been received. The headquarters of this company are the Boston Building, 1650 Champa street, Denver, Colorado, U.S.A.

In the Triplex Rolls an entirely new departure is roll construction has been undertaken, viz., the insertion of a third and larger roll between the faces and at right angles to the two rolls as ordinarily used. This gives two grinding faces instead of one, as heretofore. Also the grinding faces are kept true automatically. Further, the elimination of grooving means that the product is uniform and that no oversize occurs. The twisting action, caused by the cross directions of the opposing faces, produces a granulating effect; and the smaller angle of nip produces a grinding zone of more than twice the area obtained in the old style of rolls. The Triplex Rolls are therefore to be recommended for their large capacity for fine and uniform grinding. They are not, in any sense, roughing rolls. Their manufacturers claim that a finished product of 40-mesh and finer may be obtained continuously throughout the life of the shells. The item of saving in tire renewals is also of importance.

CATALOGUE OF THE W. S. TAYLOR COMPANY, CLEVELAND, O.

To an ever increasing degree mine managers, and technical men generally, depend upon trade catalogues to keep constantly in touch with the latest and best machinery and accessories.

We have just received from The W. S. Tyler Company of Cleveland, Ohio, their catalogue Number 24—an excellent specimen of the printer's and engraver's art. It contains carefully arranged illustrations of the uses of woven wire and correct lists, weights, and tables relative to wire cloth, with accurate dimensions in decimals of the mesh—a feature originated by this company for the purpose of comparison.

The Tyler Double Crimped Wire Cloth is specially constructed, both as regards material and design, for long service and hard wear.

For use in stamp batteries, jig screens and trommels the Tyler Double Crimped Mining Wire Cloth has a capacity nearly double that of punched slot screens. The openings are square and uniform and the double crimp insures the integrity of the mesh.

Wire cloth to suit all requirements may not be found in the catalogue. But the W. S. Tyler Company is prepared to meet special and individual requirements and specifications.

Particular mention must be made of their rolled slot screens for stamp batteries and rotary mills. The company issues a special catalogue describing this type of screen.

In mining practice, where the acidity of the water shortens the life of the screen, phosphor bronze wire cloth may be obtained. Its initial cost is high, but its long life means a substantial ultimate saving.

The heavy revolving screens made by this company are also of extremely substantial construction.

Bulletin 31 of the Hyatt Roller Bearing Company, of Newark, New Jersey, is devoted to descriptions of the Hyatt Bearing and the Standard Hyatt Bushing. The roller of the Hyatt Roller Bearing is made from a strip of steel wound into a coil of uniform diameter. Its flexibility results in an even distribution of load on the roller itself. All tendency to distortion of any of the bearing faces is done away with. The roller also, from its construction, acts an as oil reservoir and largely simplifies lubrication. The Standard Hyatt Bushing now manufactured in a number of standardized sizes, is designed for all conditions of speed and load, and for all classes of machinery.

BOOK REVIEWS.

TECHNICAL METHODS OF ORE ANALYSIS—BY ALBERT H. LOW. THIRD EDITION, REVISED AND ENLARGED. 8 VO. XII. + 344 PAGES, CLOTH $3. JOHN WILEY & SONS, NEW YORK.

Within a little more than two years, Mr. Low's book has run through two editions. The third, a marked improvement on its predecessors, has now appeared.

Numerous incidental changes are apparent. But radical alterations and additions have been made in the chapters on aluminium, antimony, arsenic, calcium, lead, magnesium, nickel and cobalt, tin, uranium and vanadium, zinc, coal and coke.

The direct method for aluminium, described in Chapter IV., is clean, delicate and rapid. It may be made more rapid, indeed, by omitting one or two of the steps that Mr. Low recommends. An important foot-note appears on page 21. After the addition of sodium thiosulphate in presence of sodium phosphate to the acidified solution, Blair recommends boiling for 15 minutes. Mr. Low's foot-note mentions that he has found 30 minutes safer. With this the reviewer concurs. The longer period is especially necessary when the precipitate is large.

The chapter on copper is given added interest by the fact that the original methods of Mr. G. A. Guess are quoted at length and the Guess-Haultain electrodes, for the design of which Mr. H. E. T. Haultain was responsible, is described. Mr. Guess elaborated the method.

The commercial methods for coal and coke are well outlined. It may, however, be pointed out that much more constant results can be obtained with the Chaddock burner in the determination of volatile combustibles, than with the ordinary Bunsen burner. Mr. Low omits mention of the use of blast for the first three and one-half minutes. This conforms with the experience of many chemists. The use of the blast is a fruitful source of error.

In a note is mentioned the serious mechanical loss consequent upon the application of a full flame to lignites carrying high percentages of volatile matter.

Harking back to the chapter on lead, we notice that Mr. Low gives half a dozen methods but does not hint at the electrolytic method now coming more and more into vogue. In this method the lead is deposited on the anode as lead peroxide from nitric acid solution. This was first used for commercial work some thirty years ago in the Mannsfeld Laboratories in Germany. Mr George A Guess was the first chemist on this continent to use it for routine work. In 1904 Mr. Guess made it the standard method for lead determinations at the Silver Lake (Col-

orado) laboratory. It is the simplest and by far the most accurate of all methods, and its value does not depend upon the skill of the chemist.

Mr. Low's book is, perhaps, the most usable volume of its kind that we know of. It is written by a man thoroughly acquainted with the difficulties that beset the commercial chemist. Already it is an accepted standard—a position that it merits and will continue to hold.

LEAD REFINING BY ELECTROLYSIS—BY ANSON GARDNER BETTS. 8 VO. IX. + 394 PAGES. CLOTH, $3. JOHN WILEY & SONS, NEW YORK.

The electrolytic refining of lead bullion is now an established metalurgical process. The volume before us is an exhaustive and reliable treatment of the subject. Electrolytes, slime treatment, deposition of antimony from fluoride solution, refining doré bullion, refinery construction, treatment of lead containing by-products, are among the subjects treated. Three pages are devoted to a bibliography.

There are three appendices, the first of which describes the plant of the Consolidated Mining & Smelting Company of Canada, at Trail, B.C. The lead refining plant at Grasselli, Lake County, Indiana, is described in the second appendix, and in Appendix III. the treatment of lead refinery slime is dealt with.

A noticeable feature of the book is the care with which the author has incorporated practical working details.

PERSONAL AND GENERAL.

Mr. H. E. T. Haultain, who has recently spent some weeks in Cobalt, returned to Toronto on the 19th of April.

Mr. H. C. Burchell, vice-president and managing director of the Sydney Cement Company, paid a short visit to Toronto on the 20th and 21st of April.

The class day address to the class of 1908 of the Michigan College of Mines will be delivered Friday, May 1st, at the College gymnasium by Dr. Charles Richard Van Hise, president of the University of Wisconsin. The class dinner will take place the following evening.

Mr. W. F. C. Parsons, mining engineer of the Londonderry Iron & Mining Company, and Mr. W. Selkirk, of London, Eng., pased through Toronto on April 11th, after a brief visit to Cobalt.

Mr. George H. Doran, managing director of the Foster Cobalt Mining Company, has returned from a visit to Europe, where he interviewed many the leading ore buyers and operators of smelters.

The analytical, assaying and testing business in Montreal, which has for years been conducted in Montreal under the name of "Milton L. Hersey," he recently been re-organized and enlarged. The "Milton Hersey Company, Limited, Chemists, Engineers and Inspecors," is now a joint stock company, of which Mr. Hersey is president, Mr. C. L. Trimingham vice-president, Mr. C. R. Hagen second vice-president, and Mr. Joel B. Saxe secretary-treasurer. In addition to their offices and laboratories at 171 St. James street, Montreal, a physical testing laboratory has been opened.

SPECIAL CORRESPONDENCE

Nova Scotia.

GLACE BAY.

Mr. Neil Gillis, he local member for the Provincial Parliament, on the 14th April asked for a Commission to investigate the question of an eight hour day for miners, similar in character to the Commission that was appointed to deal with the question of old age pensions. Mr. Gillis gave several reasons in favor of an eight hour days, first that it would minimize the danger to life and health of working underground. He said that the dangers to health from working underground were well known, and instanced the legislation now under way in England and other countries.

The contention that work underground is detrimental to health has been repeated so often that, except by those who know to the contrary, it is accepted as a fact without question. It has in fact become a shibboleth that is glibly repeated by many people, and there is a general tendency to commiserate the unhappy lot of those who in popular parlance "toil in the bowels of the earth." This sentiment is to a certain extent an echo of the terrible and miserable conditions that used to exist in coal mines in England and Scotland before the passing of the Coal Mines Regulation Act. If any person should wish to read a chronicle of unmitigated sordidness, a record of human greed and slave-like ignorance, of the murder of children and the degradation of women, let them read the evidence that was taken before the Royal Commission of the seventies, just before the passing of that monumental and satisfactory piece of legislation—the Coal Mines Regulation Act of 1870. There are graves of children all up and down the mining districts of England who were killed in the mine. One grave in Silkstone churchyard, Yorkshire, tells of the drowning of twenty-one children, ten boys and eleven girls, whose ages ranged from seven to sixteen, who were at work in the mine. Tales were told before that Commission of girls of tender years who worked half naked in wet and muddy mines, dragging boxes of coal on the pavement without rails by chains attached to the box and passed around their necks. At that time the life of the miner was one of sordid misery and ignorant debauchery, and what underground conditions were like may be gathered from the obelisks and monuments that are scattered throughout the English mining towns telling of the hundreds and thousands laid beneath who died in explosions in the mine.

But conditions have changed since that almost forgotten day. The miner, the "coalier" as he was called, was the last man in the British realm to receive the franchise, but to-day he polls the most telling and solid vote of any section of the working community. What are the actual conditions of life underground to-day? First of all, the miner works probably the shortest hours of any workmen, and also the least number of days. It is very rarely that a miner works more than five days a week, and in very few places, whether the eight hours bill is law or not, does he work more than eight hours a day. He receives high wages, particularly in this part of the world. The conditions under which he works are not, despite all assertions to the contrary, the most inimical to health. Compare the conditions of underground life with those of the alkali worker, the file-cutter, the tailor, women workers in factories and shop, with that of an engine driver on the railway, a stoker in a modern battleship or stoking an ordinary boiler. Compare it for hours with the dress-makers in large cities and the girls employed in huge departmental stores, with the ordinary surface day laborer or the ordinary everyday clerk. There is a great deal of uncalled for sentiment talked about the hard lot of the miner, for which there is no warrant. Statistics are against the popular belief, both mortality and sickness certificates,

and the refusal of insurance companies to insure miners at ordinary rates is not based on a belief that they are the subjects of ill-health, but on the recognized dangers to their lives from accidents which may involve a large number of men at one time. When at work underground the miner is in an equable temperature, not exposed to any of the weather vagaries. Every winter in Cape Breton the surface laborers around the Steel Works flock to the mines to get work under cover, where they are safe from the bitter blasts of our drift-ice cooled atmosphere.

As to the application of an eight hours Act in Cape Breton, the chief objection from the view of the operators would be the further limitation of an already limited season. The only way in which the Cape Breton operators could get the full output out of their mines and properly utilize their machinery would be to work three eight hours shifts per day, but this would necessitate night work. The P. W. A. object to night work, which they consider is even more debilitating than the ordinary work of a miner, and they asked recently for a one-quarter of a cent per ton increase for night work. Such a distribution of the work would produce a very acute situation when the shipping season ended and the collieries went on slack time for the winter. Under the present method of working this sudden diminution of the organization around the collieries at the end of the shipping season has been practically abolished, and this season the amount of double shift work that is being done will be the least of any previous season for a long time past. The fact, however, cannot be got over that the St. Lawrence is the market of the Cape Breton coal field, and that access to the St. Lawrence is barred from the middle of November to the middle of May. This is the problem of the operators, and it is also the problem of the miner. An eight hour day will not help to straighten it out.

In England the eight hour day bill is being forced through the House of Comons by an unwilling Government, against the expressed wishes of the whole community outside of the miners themselves, and against even the wishes of a section of the miners also. The statement of the English operators that it will necessitate an increase of 50 cents per ton in the price of coal has not been disproved. An increase of this amount will mean an increase in the manufactured cost of iron and steel of from $1.25 to $1.75 per ton. The effect of such an increase in the price of raw material can easily be foreseen on the English iron trade. The iron trade in England is the great customer of the coal trade, and unless one is prosperous the other must decline. If the eight hours bill is forced through the Houses of Parliament, not only will the English coal miner suffer the pinch of poverty, but his comrades in the iron trade and other trades will know the meaning of adversity.

Nova Scotia is perhaps the Province of Canada that is most closely allied by blood and by tradition to the Mother Country, and the Legislature of this Province has always followed closely the trend of legislation in England. At the present time, however, England is confessedly experimenting in class legislation, and some persons of eminence and learning, not necessarily prophets of evil, say that she is riding to a fall. Nova Scotia would do well to wait and see what happens before she enacts legislation that may very seriously hamper her industrial development, and for which there is no necessity.

The first ship to leave Cape Breton for Montreal this season was the "Norfolk," which cleared from Louisburg on the 9th April, bound for the St. Lawrence. The "Ellen" left International Pier on the 15th for the same destination, and in all probability she may reach port before the "Norfolk," as the latter vessel was detained in the drift ice off Canso.

Regarding the talk about amalgamation of the P. W. A. with the U. M. W. A., we notice Seaside Lodge, Port Hood, passed a resolution pledging themselves to stand by the P. W. A. and calling upon its members to resist the attempts that are being made to disrupt it. The Golden Rule Lodge, Dominion, have declared against amalgamation, and Equity Lodge, Caledonia, refused to discuss the matter. The 'Sydney Daily Post," for some occult reason best known to itself, has recently published several articles which might have been written by the walking delegate of the U. M. W. A. With this single exception the press has been unanimously hostile to amalgamation talk, and in this it has represented the concensus of public opinion. The "Post," however, has never regarded Glace Bay nor its industries with a friendly eye, and it never seems to remember that everything that hurts the industries of Glace Bay must react on those of Sydney. Such counsel as it is wont to give to its readers in the colliery districts may act as a boomerang some day.

Ontario.

Cobalt.

Silver Leaf.—The big vein shows up better at 125 feet than it has since the shaft was started. The main vein, which is twelve inches wide in the bottom of the shaft, carries remarkably high values. Two additional veins have been encountered. A 35 ton car of "A1" ore is being loaded. The management estimate the ore to run between six and seven thousand ounces to the ton. One car of low grade ore has been sent to the dry concentrator and over a car load is at the mine ready for shipment. A suit has been instituted by D. W. Maguire, as secretary of the Silver Leaf Mining Company, against the firm of Douglas Lacey Company, brokers, for the recovery of the returns from the sale of treasury stock of the company, sold by defendants and not accounted for to the company. The amount involved is $167,000.

Silver Queen.—A 22 ton car of ore was shipped to Copper Cliff on the 20th ult., which is expected to average five thousand ounces to the ton. The foundation for the new twelve drill Rand compressor is being prepared.

Colonial.—An important strike was made here last week. In driving in No. 4 tunnel a vein of native silver and calcite, 6 inches in width, was struck, the Tunnel had been driven in on a small seam of little value, but on putting a hole in one wall this rich vein was found. It has already been opened up for a length of 90 feet or more.

T. & H. B.—The crosscut driven north from the shaft has cut the "cobalt vein." This vein occurs at the contact of the conglomerat and keewatin and on the surface showed three feet of smaltite carrying little value in silver. Where cut below it carries silver, smaltite and niccolite.

Silver Bar.—Work has been resumed here. A shaft is being sunk and is now down 25 feet. In the bottom the vein is four inches in width and will average four thousand ounces.

Crown Reserve.—A car of 20 tons of remarkably high grade ore is ready for shipment. It is estimated to run from eight to ten thousand ounces silver. The vein from which the ore was taken is probably the richest so far uncovered in the camp, and one of the widest in the Cobalt district. A party of the directors of the company visited the property on April 11th.

Nipissing.—Mr. T. R. Drummond has left and Mr. R. B. Watson is now in charge here. Mr. Drummond was well liked throughout the camp, and before leaving the mine managers and some of his friends presented him with a silver tea service. The working men at the mine gave him a gold headed cane. The report for March shows that during that month there was mined ore to the value of $105,347 and 125.3 tons shipped with a value of $145,510. The ore available on April 1st is given at a value at $935,000. On January 1 this was given at $1,057,000, so this means a decrease of $122,000. The shaft on the Kendall lead is down 135 feet. The vein in the bottom runs from three to five hundred ounces per ton and is 5 inches in width.

Kerr Lake.—This company is, like many others here, sending shipments to different parts of the world to see where they will get

the best results. They are about to make a shipment of 100 tons of high grade ore to the Beer Ganheimer Company of Hamburg.

LARDER LAKE.

The Maxwell-Harris mill is running and the first brick, valued at $450, has been brought down from there.

At the Reddick, Mr. W. M. Ogilvy is in charge and supplies for four months are being rushed in before the snow goes. The 20 stamp mill, which has been on the ground for some time, is being set up.

MAPLE MOUNTAIN DISTRICT.

Supplies and equipment are being rushed in to the White properties at Maple Mountain. A small boiler, pump and hoist have already gone in together with lumber, etc., for construction purposes. A large compressor plant will be sent in as soon as navigation opens. These claims have been bonded by an English syndicate and are under the management of Mr. R. W. Foster, M.E., of Cobalt.

THE STRIKE SITUATION.

Botley, the union secretary, addressed the crowd in the square on Saturday evening. He told the workingmen that last year's strike had never been called off, that through stress of circumstances they were compelled to work this past winter in "unfair mines," but now that spring had come they should quit work, and any who still worked would be considered as enemies of organized labor. Not more than fifty men in the whole camp left their work and those that did were mostly men who had worked in the mines for the winter and were glad to go back to their farms. For every vacancy at a mine there are dozens of applicants who want work. No public meetings in the square will be permitted this year.

British Columbia.

ROSSLAND.

The mining men at this point are looking forward to a meeting of the Canadian Mining Institute, which will be held here on May 14th and 15th. Several technical papers will be read and discussed and other Institute business will be given consideration. Young mining men here are showing interest in the idea of a mining school being connected with the proposed Provincial university. An institution of this character would be a great aid to the rising mining men of the Province, and it is hoped that in due time it will come to pass.

Rossland continues to look with hopeful eyes toward the South Belt, where considerable prospecting and development work is being executed. The Blue Bird tunnel is now in over 70 feet, and the ledge shows up 4 1-2 feet wide in the face. The ledge appars strong and well defined, and the prospects are good for its downward continuation. The lessees are storing ore in the Homestake bins and now have 50 tons on hand, which will be shipped as soon as the spur is fitted up. Work has been commenced on the Pot, Alberta and Sunset claims. Development on the Giant-California is showing good results.

The following ore shipments were made during the week ended April 4th:—

	Week.	Year.
Centre Star	3,960	46,598
Le Roi	1,680	23,734
Le Roi Two	490	8,418
Evening Star	31	428
Iron Horse	38	38
Blue Bird	....	30
Total	6,199	79,246

The shipments for the week ending April 11th only amounted to 5,350 tons, the first three mines only shipping.

The Trail smelter received 6,150 tons of ore during the week ending April 11th. Besides the Rossland ore the following mines contributed to this tonnage: Rambler-Cariboo, 66 tons; North Star, 71; Scerro Verde, 9; St. Eugene, 536; Whitewater, 43; Eva, 23; Snowstorm, 468; Silver Cup, 33; First Thought, 294; True Fissure, 32 tons. The Trail smelter is now producing 20,000 tons of lead per annum, also copper mater, 999 1-2 fine silver, and gold bullion. The copper matte is shipped to the Tamoca refinery, the silver to Ottawa, New York and Hong Kong, and the gold to Seattle.

As will be seen by the above table of shipments, the Iron Horse has joined the list of shippers. This property adjoins the Enterprise, of the Consolidated Company, and has a good showing in the workings. The property has been leased to Rossland men by C. F. Jackson, the managing director, of Spokane. The ore runs from $14 to $38. Only four men are working on the property at present.

Smelter men here will watch with interest the results of the car of Cobalt ore sent to the Trail smelter from the Nancy-Helen mines. It is to be hoped that the freight and treatment charges will be found low enough to allow of continued shipments.

PHOENIX.

Phoenix received a visit from Richard Merton, of Frankfort-on-the-Main, Germany, last week. Mr. Merton is closely connected with the Metalgesselschaft, a company that deals extensively in copper, silver, zinc, lead and other metals. Mr. Merton was much interested in what he had seen of the mining industry of British Columbia and stated that during his travels he had seen nothing that compared with the Granby workings as far as low costs and economical operation were concerned. It was his opinion that copper would gradually rise to what should be its normal price, 17c or 18, as soon as the financial sky had cleared up and the manufacturers were again receiving steady orders.

The Granby shipments were somewhat lower during the week ending April 11th than what they had been for some time previous to that. The shipments amounted to 21,063 tons and the smelter treated 22,820 tons.

The 264,581 tons of copper-gold ore (dry weight) shipped from the Granby mines during the first three months of 1908, more than doubled the output for the same quarter of 1907, when the tonnage was only 130,483 tons.

The following comparative table shows the output for both quarters segregated:—

	1907.	1908.
January	34,192	74,203
February	32,465	80,155
March	63,826	110,223
Total	130,483	264,581

The Granby output practically represents the ore production of the Boundary this year, the Snowshoe, Crescent and Sally being the only other shippers. The Granby freight and treatment rate has now been got down to the $2.50 mark. On the tenth instant at Phoenix the Granby employees received $55,000 for their March wages, and at the smelter $35,000 was distributed. Hereafter 15,000 tons of ore will be kept on hand at the smelter as an emergency lot.

A small gasoline prospecting plant has been set up at the Little Bertha and some development work will be done. The Crescent mine has closed down. The plan of operation is to be modified. Mrs. Ida M. Parsons, of Minneapolis, secretary of the Alliance Gold & Copper Mining Company, is in Greenwood on business for that company. This company owns the Moreen, electrically equipped, claim, in Deadwood camp. Word has been received that the men

who are promoting the Greenwood prospecting tunnel idea in Chicago have succeeded in raising funds to begin the work.

SLOCAN, ETC.

The Blue Bell, on Kootenay Lake, which supplied the early trappers with lead for their bullets, is to be worked on a larger scale than heretofore, this season. There are big ledges of lead and zinc on this property. A syndicate of London and Nelson men have secured a lease on the Hall mine, near Nelson, and will begin work at an early moment. As to whether they operate the smelter or not, that will depend upon how the work at the mine turns out. A New York syndicate has purchased the Molly Gibson group of claims in the group. Assays made from the ledge average from $10 to $80 and $100. The Slocan Star Company has encountered a good ore body on the Hidden Treasure. A Nelson syndicate has bought the moiety of a Spokane man in the Nugget on Sheep Creek. A company has been organized to take over the Ophir-Lade, Lucky Jack and Swede groups of the Great Northern Mining Company, and development work is to be started. The Silver Cup mine has a good reserve of ore blocked out and the mine is looking well. The 160 tons of ore shipped in March netted the company $10,000. A rich strike has been reported from the St. Elmo claim of the True Fissure Company. Shipments are being made to Trail smelter. The ore runs as high as $80 per ton.

A strike of good ore has been reported from the Half Moon prospect at Moyie, near the St. Eupene. Development on the Aurora, across the lake from the St. Eugene, is giving good results. A quantity of shipping ore is blocked out. The St. Eugene paid out $40,000 wages for March.

The Big Bend Mica Company has been organized to work 1,400 acres of ground north of Revelstoke. The Tyee Copper Company has taken a bond on a rich group of claims on Moresby Island. Great activity will be manifested on the Queen Charlotte Islands in the future. There are many rich mines there that can be worked with copper at a very low price. Some of the ore now being mined runs from $60 to $100 per ton.

The following shipments were made through Kaslo during March:—

	Tons.
Whitewater, concentrate	266½
Whitewater Deep, concentrate	22½
Rambler	179
Ruth, concentrate	40
Reco	20
Slocan Sovereign	20
Ferguson Mines (sampler)	60
Total	548

The Sullivan smelter will continue to be operated until the supply of ore on hand is treated.

The International Coal & Coke Company have declared a 2 per cent. dividend, payable May 1st. They are shipping 2,500 tons of coal per day and are making preparations to increase their output to 3,000 tons. Diamond drill prospecting is being done on the Royal Collieries ground.

Negotiations are now pending for the sale of the only known large hematite iron ore deposit on the coast. This deposit is on Salt Spring Island, and Seattle people are endeavoring to acquire it.

As the gneiss and schist formation in the Findlay river country is favorable and as there are numerous streams to assist in collecting the precious metal, it is stated that there is no reason why there should not be plenty of gold in that district. It is the consensus of best opinion that the most favorable route to these "diggin's" is via Port Essington and Hazelton.

GENERAL MINING NEWS

NOVA SCOTIA.

HALIFAX.—The following bill was introduced by the Commissioner of Mines on Tuesday, April 7th. It is supported by the Dominion Coal and the Nova Scotia Steel Companies, and is opposed by the Dominion Steel Company:—

The bill was read a second time Wednesday and sent to the Law Amendments Committee, before which the struggle is now being conducted.

The text of the bill is:

Be it enacted by the Governor, Council and Assembly as follows:

1. Notwithstanding any provision of "The Mines Act" or any amendment thereto, the Governor-in-Council may, on application of any person interested, cause to be made a re-adjustment and settlement of the boundaries of any lease or leases of submarine coal mining areas situated in the County of Cape Breton or elsewhere in the discretion of the Governor-in-Council, and may if necessary change the boundaries of the area or areas covered by said lease or leases.

2. If it should appear that, by reason of some error or inaccuracy in the description of the boundaries of any lease or leases, areas which were intended by the applicant to be adjoining areas and are shown as adjoining areas on the official plan on file at the Mines Office, do not actually adjoin, but are separated by an area or areas, tract of ground or territory not actually covered by said descriptions, the Governor-in-Council shall have power to extend the boundaries of such lease or leases so as to include such area or areas not covered by said descriptions, notwithstanding that any such lease may thereby include more than one square mile, and notwithstanding that application may have been made for a license to search or lease such areas or areas not covered by said descriptions or any part thereof.

3. Before any such re-adjustment, settlement, change or extension of boundaries is made, such parties interested in the lease or leases affected and any lease or leases, license or licenses to search which may be affected, as the Commissioner directs, shall, at least ten days before the hearing of such application be notified by the applicant of the time and place of the hearing of such application by the Governor-in-Council.

4. The hearing of such application may be adjourned from time to time, and any surveys may be ordered to be made, and for all the purposes of the hearing of any such application, the Governor-in-Council shall have all the powers which the Lieutenant-Governor has power to confer upon a Commissioner under chapter 12 of the Revised Statutes, 1900, "Of Inquiries Concerning Public Matters."

5. Upon the making of any Order in Council under the provisions of this Act the title to the coal in the areas affected by such Order in Council shall vest in the respective lessees whose areas are affected thereby according to the terms of such Order in Council, and the description of said areas as contained in the respective leases may be surrendered and new leases issued in lieu thereof containing the same terms and conditions as the surrendered leases, but containing new descriptions, varied according to the provisions of any such Order in Council. Any lease so changed or new lease so issued shall be valid and effectual for all purposes as if the

same had been issued under the Mines Act and amendments thereto.

6. Unless otherwise ordered by the Governor-in-Council all expenses incurred in connection with the hearing and determination of any such application shall be paid by the applicant.

ONTARIO.

PORT ARTHUR.—The Atikokan Iron Company will soon put the blast furnace in commission again. Orders for pig iron have been placed and only the opening of navigation is awaited.

SAULT STE. MARIE.—On April 9th a notice was posted at the steel plant of the Lake Superior Corporation stating that the works would be closed down until April 13th. Scarcity of pig iron was the cause.

LARDER LAKE.—Mr. Englehart, chairman of the T. & N. O. Railway, was recently presented with a petition requesting the immediate construction of a railroad from Boston station to Larder City. Mr. A. A. Cole, the engineer of the T. & N. O., is to make a preliminary survey of the proposed route at an early date.

COBALT.—The fire at the Foster mine destroyed only a small warehouse, which was fully insured.

During the week ended April 11th the McKinley-Darragh made considerable shipments of low grade ore to the Deloro smelter. Twenty miners are working double shift.

BRITISH COLUMBIA.

FERNIE.—The slack demand for coal has not affected the coke output. The C. N. R. Coal Company's ovens are in full operation.

The Crow's Nest Pass Coal Company is to make extensive improvements in its plants at Coal Creek and Michel collieries. New compressors, haulage system and other machinery have been installed, and the large new steel tipple at Michel is being rushed.

NELSON.—It has been announced that Mr. M. S. Davys, who is now in London, Eng., has succeeded in forming a development syndicate for the purpose of working the Silver King mine. The Hall mines smelter was originally built to treat the Silver King ores.

VANCOUVER.—Gypsum has been discovered in commercial quantity within 60 miles of Vancouver. A plant is to be erected.

Phoenix, April 14.—On Sunday, for the first time in many weeks, practically no work was done at the Granby mines, and for the next two months or more there will be no Sunday work at these properties. Manager Hodges states that this is on account of reducing the shipments somewhat for a time, this in turn being caused by the blowing-out of a furnace for connecting up with the new steel flue dust chamber. Now that the organization is complete and in excellent running order, the management prefers to give the employees a day off every week and not lay off any of the men, those at the smelter being largely absorbed in the new work going on.

To-day the first of the battery of eight blast furnaces was blown out for connecting up, and they will be treated in this way one after another, leaving an average of seven furnaces in blast all the time. When the No. 2 furnace was allowed to go cold to-day, it was the first break in the remarkable run made by the smelter recently—the best in its history. For six or seven weeks the entire battery had been in commission, without a break of a single furnace for as much as 24 hours, which is considered by smelter experts a remarkable achievement in smelter practice with so large a battery of furnaces.

For the months of April and May, at least, the tonnage treatment of the Granby smelter will be, probably, from 15,000 to 20,000 tons less than for the month of March, which far exceeded all previous records at this or any other smelter in Canada.

Part of the structural steel has begun to arrive at the Granby smelter for the extensive enlargement of the converter building, and from this on carloads of material will be brought in from the east for this and other enlargement purposes, which are to begin this summer and give the smelter when completed a daily capacity of 4,500 tons of ore.

ALBERTA.

Calgary, April 16.—Three men were killed and four others seriously burned by an explosion at what is known as the Old Mine at Canmore yesterday. The dead are Gus Capelson and Matt Starr, Finlanders, and W. Wilmott, an Englishman, acting as fire boss. The latter leaves a wife and family of four little ones, who only arrived from England a few months ago. The injured are all Finlanders. The cause of the explosion has not been determined yet, and the mine has been closed, pending an investigation.

Edmonton, Alta., April 16.—An explosion of gas occurred yesterday afternoon at 1.45 o'clock in the Dawdo coal mine on the south bank of the Saskatchewan river, opposite the Alberta Penitentiary, which resulted in two coal miners, Joseph Anderson and Andrew Hugle, being injured. The cause of the explosion is supposed to have been the sudden liberation of some gas which was ignited by the open lights worn by the two men.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The quantity of coal mined in the United Kingdom, which was 251,050,809 long tons in 1906, increase to 267,828,276 long tons in 1907. Of the latter quantity, England furnished 187,383,846 tons; Wales, 40,252,178; Scotland, 40,092,548; and Ireland, 99,704 tons. The number of persons employed in workings coming under the Coal Mines Act was 757,887, an increase of 58,273 over the previous year.

Ten miners were killed in an explosion of coal gas in the Norton Hill colliery, Somersetshire, on April 10th. A rescue party were overcome by the fumes and saved only with the greatest difficulty.

FRANCE.

French imports of nickel from New Caledonia have been about 120,000 tonnes during the last three years. The production of metal at the works of the Societe Le Nickel near Havre is from 1,700 to 1,800 tonnes annually. The company is about to build a plant at Port Bouquet for treatment of ores and refining. After treatment in waterjackets the ore will be transformed into oxide by calcination and then refined for pure nickel. Electric furnaces will also be installed for the manufacture of ferro-nickel.

The French production of ferro-manganese and spiegel in 1907 was 27,000 tonnes.

INDIA.

A discovery of tungsten ore has been made at Agargaon, some 25 miles south of Nagpur in the course of prospecting for manganese. The occurrence of the ore which is found in quartz stringers in a belt of mica schist has been proved for a length of 1,400 feet.

A special survey of the tin mining industry in South Burma is being undertaking by the Indian Geological survey. The industry has expanded considerably during the last two years, the output of tin ore from the Mergui and Tavoy districts having advanced to a value of £13,574 in 1906-7.

NORWAY.

The Norwegian Government has appointed an official commission to make an investigation into the actual condition of the manufacture of pig iron and steel in Europe by the electric process.

ITALY.

A 15,000 horse-power hydro-electric works has been built on the River Pescara, at Piano d'Orte for the manuracture of cyanamide by the process invented for the fixation of atmospheric nitrogen.

GERMANY.

The zinc ore production of Prussia in 1906 was 702,932 tons of which 188,249 tons cisonsted of calamine and the remainder of blende. The number of workmen employed was 16,366.

RUSSIA.

Gold mining in the Amur region is undergoing a serious crisis the yield of gold having fallen from 642 poods in 1901 to 470 poods in 1905 and preliminary estimates for the last two years placing the yield at about the same figure as that of 1905. Increased cost of labor and unsettled conditions are assigned as the cause.

The year 1907 witnessed a great development in the manganese ore industry of the Nikopolsk region, South Russia. There were 15,500,000 poods extracted and 16,320,000 marketed in that year as compared with 9,580,000 poods extracted and 12,650,000 marketed in 1906.

SOUTH AFRICA.

The experiment of giving work in the Rand mines to the unemployed has proved a failure. It was proposed to take on 400 men for unskilled labor, some of the mines offering 4 and others 3 shillings per day but the men generally declined to accept these terms.

The working costs of the Robinson mine, Johannesburg during March amounted to 13 shillings per ton which is a record figure.

BRITISH GUIANA.

Gold mining in this colony has been declining steadily since 1900. In that year the output for the fiscal year ending June 30th, was 114,102 ounces and the number of miners employed 16,588. In 1906-7 the output had fallen to 85,505 crude ounces and the number of miners to 8,234.

UNITED STATES.

An agreement was effected at Toledo, Ohio on the 17the of April between representatives of 200,000 bituminous coal miners who recently went out on strike and the operators, under which work in the central districts affected was resumed. The old rate of 90 cents per ton was agreed upon, and a referendum vote on the two-years agreement is to be taken. The working day was fixed at 8 hours.

The Great Bonanza Gold Mining Company of London, England, has bought the Next President and Bledsoe mines near Denver, Colorado, for $40,000.

The American Society of Civil Engineers will hold their annual convention in Denver, June 23—26.

The total value of the metallic production of Colorado in 1907 was $40,847,835, a decrease of $3,051,240 as compared with 1906.

COMPANY REPORTS.

The seventh annual general meeting of the shareholders of the Le Roi No. 2, Limited, was held in London, Eng., on March 3rd, Lord Earnest Hamilton (chairman) presiding. The chairman, in his report, said that the small results of the past year's work do not in any way reflect upon the intrinsic value of the company's property. Advantage was taken, he stated, of the coal and smelter troubles, which restricted the output, to push development in the mine on a more extensive scale than in previous years, and the result has been strikingly successful—so much so that against the poor returns of the past financial year there is a more distinctly favorable outlook with regard to the future than it has been possible to record at any previous meeting.

In regard to the life of the mine, the chairman stated that Messrs. Hill and Stewart, who four years ago declined to guarantee more than eighteen months' life, wive it as their opinion that the company can now look forward to three years of production at the rate of from 2,000 to 2,500 tons a month. The probable reason for Messrs. Hill & Stewart extending the lifetime of the mine to three years is the H Vein, which for a long period on the 500 foot level had been the chief source of supply, has, during the past twelve months, been definitely located on the 700 and 900 foot levels; on both of which levels payable values occur. The diamond drill has also located a payable ore body of considerable size at a depth of 1,350 feet, or 450 feet below the bottom of the shaft. With regard to the immediate future, the chairman stated that there is reason to believe that the company can look forward with tolerable certainty to a succession of good returns from the mine, though it must not be lost sight of that the returns for January were abnormally high and must not be looked on as a sample of what can be expected every month. Still, with returns considerably lower than this, dividends of a satisfactory character can be paid.

In the case of the Coneurry Syndicate, the chairman stated that a profit is at the present moment actually secured.

Chairman Hamilton told the meeting of the success that the company was making of the Vancouver property, in the Slocan, which had developed most favorably during the past eighteen months. The Vancouver mine was one of exceptional value. He stated that it was proposed, with as little delay as possible, to float the Vancouver as a separate company. In this case the Le Roi Two will be in the position of the company promoter and all

the advantages attached to the deal will be offered in the first place to the shareholders of this country.

The chairman paid a high tribute to Paul S. Couldrey, the representative of Messrs. Hill & Stewart at the mines of the company, and said it was almost entirely due to his personal enterprise, energy, ability and devotion to his work that they are in such prosperous condition. He asked Mr. Couldrey to give some information in regard to the company's mines.

Paul S. Couldrey said: With regard to the Josie mine, you will be pleased to learn that we are now working the Hamilton vein on four levels, namely, the 300, 500 and 700 foot, and intermittently on the 900 foot level. I do not think working has ever been so distributed throughout the various levels of the mine as at the present time, certainly not in connection with any one vein. We have now nine or ten stopes working on the Hamilton vein alone, of which the West H stope on the 500 foot level is at the present time about 500 feet long itself. We feel that, having now opened up at so many points and over such a large area, the most regular vein we are ever likely to find in our Rossland properties, the chances of sudden and simultaneous impoverishment everywhere are getting smaller every day. With regard to the ore reserves, we would now have no difficulty in estimating with tolerable exactness the quantity of ore which lies ahead of us in certain specified blocks of ground, but any such estimate would be totally inadequate if they conveyed to you the idea that this was all the ore the mine contained. In opening up the Hamilton vein we pushed the work on the 500 foot level (having ore to follow) so far ahead of all the other levels that it is only now that we are getting to points vertically above and below the eastern end of our West H 500 stope. Hence the impossibility as yet of estimating the ore which lies above or below the 500 West H. without which any estimate would be altogether valueless.

Mr. Couldrey gave considerable attention to the Vancouver mine and stated that concentrates and ore to the value of $100,000 had been shipped in eighteen months. The development work and its good results were reviewed at length, and revealed that the mine is in a favorable condition.

C. Bartlett wished to know how it was that the shipments had not been increased when the prices were high, and now that they had gone down they were increasing their shipments.

The chairman, in reply, said they were more or less in the hands of the smelters, and it did not suit the smelters to take more than a certain quantity of their ore at the then price of copper.

Mr. Bartlett pointed out that the shareholders had not received any pecuniary benefit by the increased cost of copper. That was a most extraordinary state of things.

Mr. Couldrey stated that none of the neighboring companies had reaped any benefit from the increased cost of copper, for the simple reason that when copper went up wages went up, and the Amalgamated Copper Company could afford to pay these wages better than this company could, and they and other powerful companies immediately raised them. After a great deal of heart searching this company raised the wages to $4 a day. Almost immediately after that the copper slump occurred.

Mr. Lionel Harris thought last year's working had been most satisfactory. They had heard with great satisfaction from Mr. Couldrey, and also the chairman, that although they could not look forward to returns, such as they had last January, they might continue to look forward to very satisfactory returns.

The retiring director, Lord Ernest Hamilton, was re-elected.

The chairman stated that the Vancouver was to be incorporated. The capital stock of the company would be £100,000 in £1 shares, divided into 30,000 preference shares and 70,000 ordinary shares. The 30,000 preference shares would be the working capital, which would be offered for subscription. Those who subscribed for these 30,000 preference shares would get as a bonus 20,000 ordinary shares. With regard to the distribution of the profits it was proposed that an annual dividend of 10 per cent. on the whole of the capital of the company would be first paid. This would absorb £10,000. Any surplus profit available for distribution after that 10 per cent. had been paid was to go to the holders of the 30,000 preference shares until they had been paid in full. From that moment the preference shares would cease to exist as preference shares, but they would rank as ordinary shares. It was not intended to take any formal vote on the matter at this meeting. He might add that they proposed to offer these 30,000 preference shares to the shareholders of this company, so that the advantages accruing from this flotation will be divided amongst the shareholders either qua shareholders pure and simple or as members of this company.

On the motion of Mr. Lionel Harris, a cordial vote of thanks was passed to the chairman, directors and staff for the way in which they had conducted the affairs of the company.

SILVER QUEEN

The annual meeting of the Silver Queen Mining Company was held in Toronto on April 22nd.

The Directors Report presented the following facts:—

Receipts during the past year from production or ore amounted to $112,552, and there is still due from the smelters (not including the 22 1-2 tons shipped the other day) $61,860.00, or a total of $174,421.79. General expenses were $90,285.38 leaving a balance on hand and due from smelters, as of March 31st, of approximately $120,000.00.

During the last ten months of the current year the mine produced 20 car loads of ore, three of high grade, four of second grade and thirteen of low grade.

The old officers were re-elected. They are Lieut-Col. John I. Davidson, president; F. L. Culver, first vice-president and general manager; R. W. Gordon, second vice, and J. H. Stephens, secretary-treasurer.

The directors are R. W. Gordon, F. L. Culver, A. J. Young, Lieut-Col. Davidson and P. S. Hairston.

A regular quarterly dividend of 3 per cent. was declared and a bonus of 2 per cent. was added to the first dividend.

SYDNEY CEMENT COMPANY.

The annual report of the Sydney Cement Company, Limited, for the thirteen months ending 31st December, 1907, is extremely encouraging. The total output was 63,498 barrels, more than double the production of the previous year. The sales amounted to 60,496 barrels, as compared with 33,522 during the preceding year.

The net profits show up in a most gratifying way, amounting to $21,416 for the thirteen months, as against $1,468 for the eighteen months preceding.

A dividend of seven per cent. in the preferred stock has been declared, and will, if sanctioned by the shareholders, be paid on June 1st next. In addition to this a total of $13,239.17 was spent during the year in improving and extending the plant.

The installation of a fourth tube will be recommended. This would increase the capacity of the plant by 150 barrels per day, or approximately thirty per cent.

The Sydney Cement Company is the only cement manufacturing plant in Canada east of Montreal. From the geographical position of Sydney, the Company's shipping facilities for the export trade are unexcelled.

The plant has now reached its estimated output. In spite of handicaps, and periods of enforced idleness, the output has steadily increased. When the arrangements have been completed for

doubling the output, costs will have been reduced to such a low figure that the Maritme Provinces' trade can practically be controlled.

"Rampart" cement, the Sydney Cement Company's brand, has won a strong position in the Canadian market. As it is the only slag cement manufactured in Canada, its reputation is of more than passing interest.

Mr. H. C. Burchell, who is Vice-President and Managing Director, has our hearty congratulations, as also have the other executive officers.

STATISTICS AND RETURNS.

The Nova Scotia Steel and Coal Company will send in the vicinity of 270,000 tons to the St. Lawrence this year.

Following are the figures of output for the Dominion Coal Company and the Dominion Steel Company.

The Coal Company's output for the first three months of the year compares as follows with 1907:

	1908 Tons.	1907 Tons
January	314,322	269,090
February	282,508	226,190
March	344,000	212,000
Total	940,830	707,280

The Steel Company is also showing big gains, the output for the three months being:

	1907 Tons	1908 Tons
Coke	91,350	116,500
Pig iron	50,167	79,045
Ingots	54,327	73,764
Blooms and billets	64,664	74,967

The output of the Crow's Nest Pass Coal Company's collieries for the week ending April 17th was 12,908 tons, a daily average of 2,151 tons. All collieries were idle on Good Friday.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	Week end April 11. Ore in lbs.	Since Jan. 1. Ore in lbs.
Kerr Lake	60,330	330,710
La Rose	226,800	1,313,352
McKinley	103,780	942,400
Nipissing	43,260	943,430
Nova Scotia	40,000	120,790
O'Brien	63,810	1,448,190
Temiskaming & H. B.	43,260	361,260

The total shipments for the week were 659,040 pounds, or 329 tons. The total shipments from January 1 to date are 9,574,288 pounds, or 4787 tons.

GRANBY SHIPMENT LIGHTER.

Granby shipments were somewhat smaller for the week ended April 18th, amounting to 22,329 tons. The total for the year to date is 314,625 tons.

ROSSLAND MINE SHIPMENTS.

The shipments from the Rossland mines for the week ended April 18th and year to date are as follows:—

	Week.	Year.
Centre Star	3,136	51,598
Le Roi	1,423	24,435
Le Roi 2	676	10,211
Other mines	.....	500
Total	5,244	86,944

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:—

	April 18. Week end Ore in lbs.	Since Jan. 1 Ore in lbs.
Buffalo	45,200	517,520
Coniagas	.....	380,910
Cobalt Lake	.....	180,610
Cobalt Central	46,880	96,580
City Cobalt	.....	228,080
Drummond	.....	92,340
Foster	.....	168,600
Kerr Lake	.....	330,710
King Edward	.....	127,240
La Rose	123,900	1,437,252
McKinley	60,000	1,002,400
Nipissing	.....	943,430
Nova Scotia	.....	120,790
Nancy Helen	.....	140,420
O'Brien	.....	1,448,190
Right of Way	.....	60,210
Provincial	.....	143,210
Standard	.....	39,730
Silver Queen	.....	480,200
Silver Cliff	.....	52,00
Silver Leaf	.....	62,000
Townsite	.....	85,100
Temiskaming & H. B.	.....	539,000
Temiskaming	.....	237,250
Trethewey	.....	487,116
Watts	.....	114,430

The total shipments for the week were 275,980 pounds, or 137 tons. The total shipments from January 1 to date are 9,515,818 pounds, or 4757 tons. The totals shipments for the years 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000. In 1904 the camp produced 158 tons, valued at $130,217; in 1905, 2144 tons, valued at $1,473,196 in 1906, 5129 tons, valued at $3,900,000.

BRITISH COLUMBIA SHIPMENTS.

Following are the shipments for the week ended April 11th and year to date:—

Boundary shipments—

Mine.	Week.	Year.
Granby	21,063	292,496
Other mines	.....	462
Total	21,063	292,958
Rossland shipments—		
Centre Star	3,513	49,662
Le Roi	1,193	23,003
Le Roi 2	835	9,535
Other mines	.....	500
Total	5,531	81,700
Slocan-Kootenay shipments—		
St. Eugene	563	7,654
Whitewater	43	401
Whitewater, milled	280	4,060
Poorman, milled	250	2,850
Second Relief, milled	145	1,230
North Star	71	929
Richmond	22	490
Rambler-Cariboo	66	413
Nugget	11	317
Kootenay Belle, milled	25	200
Eva	23	159
Silver Cup	3	115
True Fissure	32	32
Sierro Verde	9	9
Other mines	.....	12,328
Total	1,733	33,634

The total shipments for the past week were 28,327 and for the year to date 408,292 tons.

GRANBY SHIPMENTS.

Exactly 264,581 tons of ore, dry weight, were shipped from the Granby mines during the first three months of 1908, which is more than double the output for the corresponding quarter in 1907, when the figures were 130,483 tons. The March run at the smelter was also phenomenal, the entire battery of eight blast furnaces being operated almost every hour in the 24 for every one of the 31 days in the month. The shipments for March totalled 110,223 tons, the smelter tonnage treated being slightly smaller as a reserve of ore was accumulated at the smelter for cases of emergency.

For the purposes of comparison, the following table will show the output of the Granby mines for each month of the first quarter in 1907 and also in 1908 in tons:

	1908.	1908.
January	34,192	74,203
February	32,465	80,155
March	63,826	110,223
Totals	130,483	264,581

For 1908 the above figures practically represent the output of the entire Boundary, as the only other shipments made from the Boundary since January 1 from any other mines were but a few hundred tons. April will doubtless show a smaller output for the Granby owing to the necessity of blowing out each of the blast furnaces while being connected with the new steel flue dust chamber now about finished and ready for use.

SMELTER RECEIPTS.

	Week.	Year.
Granby	21,063	292,496
Consolidated Company	6,150	77,446
Le Roi	1,241	24,514

The total receipts at the various smelters for the past week were 28,454 tons and for the year to date 400,186 tons.

The production of gold in the Transvaal during March was the greatest for any month, with the exception of last December, according to the face of the figures; in reality, last month's output of 574,902 ounces is better than the December total of 583,526 ounces, inasmuch as the later figure included quite a percentage of reserves that were added to the clean-up of the year. The value of the Rand's yield for 1908 should approximate $160,000,000. In face of more or less serious labor troubles the South African output has almost steadily increased ever since the discovery of the Witwatersrand less than a quarter of a century ago, and the reef has not by any means been exhausted. Science every year brings new ore bodies within reach of the shovel, especially at great depths, while, of course, the cyanide process has enabled the extraction of a much greater percentage of the metal from the ores.

According to L. Vogelstein & Company the figures of German consumption of foreign copper for the months of January and February, 1908, stand thus:—

	Tons.
Imports	29,817
Exports	1,413
Consumption	28,404

as compared with consumption during the same period in 1907 of 16,044 tons. Of the above quantity 21,910 tons were imported from the United States.

WORLD'S COPPER PRODUCTION.

Messrs. Henry R. Merton & Company, Limited, London, has just issued some valuable statistics showing the production of copper.

The 1907 production is figured at 716,435 tons, against 714,100 tons in 1906 and 682,125 tons in 1905.

The principal producing countries are figured to have turned out copper in the past four years as follows:—

	1907.	1906.	1905.	1904.
United States	395,090	409,650	389,120	365,050
Spain and Portugal	49,675	59,320	44,810	47,095
Mexico	56,565	60,625	64,140	50,945
Chili	26,685	25,745	29,165	30,110
Canada	25,615	25,460	20,535	19,185
Japan	48,935	42,740	35,910	34,850
Germany	20,490	20,340	22,160	21,045
Australia	41,250	36,250	33,940	34,160
Miscellaneous	52,130	42,720	42,045	41,560
Total	716,435	714,100	682,125	644,000

The world's production for a number of years compares as follows:—

1907	716,435
1906	714,100
1905	682,125
1904	644,000
1903	574,775
1902	541,295
1901	516,628
1900	489,514
1899	472,244
1898	429,626
1897	399,730
1896	273,363
1895	334,565
1894	324,505
1893	303,530
1892	310,472
1891	279,391
1890	269,455

Market Reports.

Coke.

April 21st—Connellsville Coke, f.o.b. ovens—

Furnace coke, prompt, $1.60 to $1.70.
Foundry coke, prompt, $2.15 to $2.25.

Pig Iron.

April 21st—Pittsburg—

No 2 foundry, $16.15 to $16.55.
Bessemer, $17.50 to $17.90.
Basic, $16.30 to $16.40.
Malleable, $16.90 to $17.15.
Southern, No. 2, $16.90 to $17.40.

Other Metals.

Tin, Straits, 31.90 cents.
Copper, prime lake, 12.90 to 13 cents.
Lake, arsenical brands, 12.85 to 12.95 cents.
Electrolytic copper, 12.875 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4 to 4.05 cents.
Spelter, 4.675 cents.
Sheet zinc, 7.5 cents.
Antimony, Cookson's, 8.87 to 9 cents.
Aluminum, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 to $26 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $45 per 75 pound flask.

SILVER PRICES.

	New York. Cents.	London. Pence.
April 2	55 1-8	25 1-2
April 3	55 1-8	25 7-16
April 4	55 1-8	25 7-16
April 6	55 1-8	25 7-16
April 7	55	25 2-8
April 8	54 7-8	25 5-16
April 9	54 3-4	25 1-4
April 10	54 1-2	25 3-16
April 11	54 1-2	25 3-16
April 13	54 5-8	25 3-16
April 14	54 3-4	25 1-4
April 15	55	25 3-8

There is little prospect of reduction in Lake Superior ore prices. Hence a number of blast furnaces may be blown out presently.

The copper market is still dull. The belief is current that heavy purchases will soon bring up the price.

SAFETY MEASURES.

In addition to what were previously considered as safety precautions, the Fairmont Coal Company is attacking the three known enemies, powder, gas and dust, in every manner posible, some of which may be of interest here.

Powder.—Ordinary black powder was formerly used in all mines of the Fairmont Coal Company, and it was considered practically safe so long as it was not accumulated in large quantities and not used where gas was generated. Its advantages were that it could be readily secured in any amount at economical cost and that it produced coal of better quality than any other known explosive. These advantages have been sacrificed and black powder is being removed, as a safety measure, as rapidly as flameless powder can be procured in sufficient and regular quantities. The largest mines have already been put on a flameless powder basis with regular shot firers, and the practice is rapidly being extended to the other mines, until black powder will be entirely eliminated. The advantage of the flameless type of powder is that it will not ignite gas or dust, even with a wild or blown-out shot. This feature is, of course, assumed from the numerous demonstrations and past practice. While flameless powder cannot be called safety powder, it certainly does eliminate to a great extent the dangers that accompany the use of black powder.

Firedamp.—Gas has ever been the greatest enemy of the mines. Its properties in the simple state are thoroughly known and the danger of its presence appreciated. The common methods of its detection depend considerably on personal opinion and fail entirely on low percentages. Mine air in which no gas can be detected by the ordinary safety lamp, is considered safe for all practical purposes. This would certainly be the case if only gas was to be contended with, but complicated with the two other dangers, powder and dust, this decision loses its positiveness and becomes a matter of degrees. Literature does not enlighten us on how much firedamp is allowable in the return air course or the return of a split. Whatever the general opinion may be it certainly should be less than could be detected by a safety lamp of the Wolf pattern.

While none of the mines of the Fairmont Coal Company are considered gasey, in the opinion of the State Mine Inspector, yet for additional security it was decided to put on a gas inspector to report on such of the mines as have shown an accumulation of firedamp. This inspector is provided with, in addition to the Wolf safety lamp, an aneroid barometer, anemometer, water gauge, wet and dry bulb thermometer and sample can for taking mine air samples. The anemometer measurements are for the purpose of checking up the mine foreman's reports on ventilation and also to estimate the quantity of water carried by the air in connection with the humidity as determined by the hygrometer.

The mine air samples are taken to the laboratory, where the CO_2 and CH_4 are determined. The method used can be relied upon to one-hundredth of 1 per cent. It has been found that one inspector can cover five mines a week, do all the analytical work and make his report.

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In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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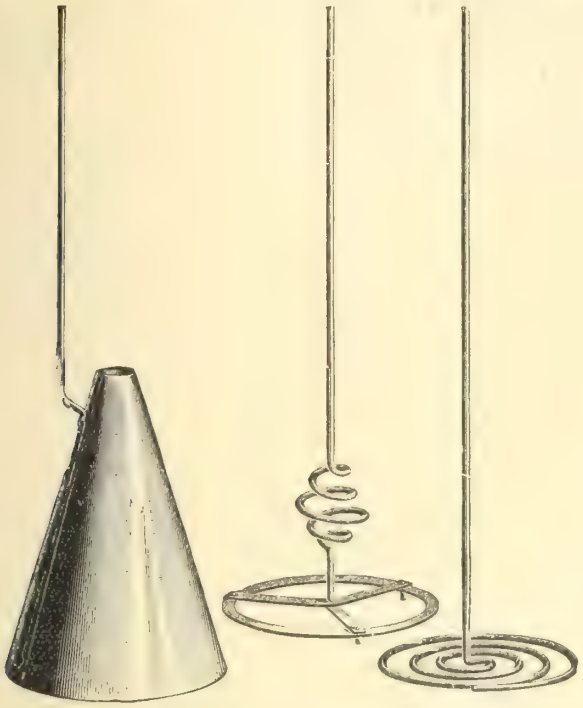
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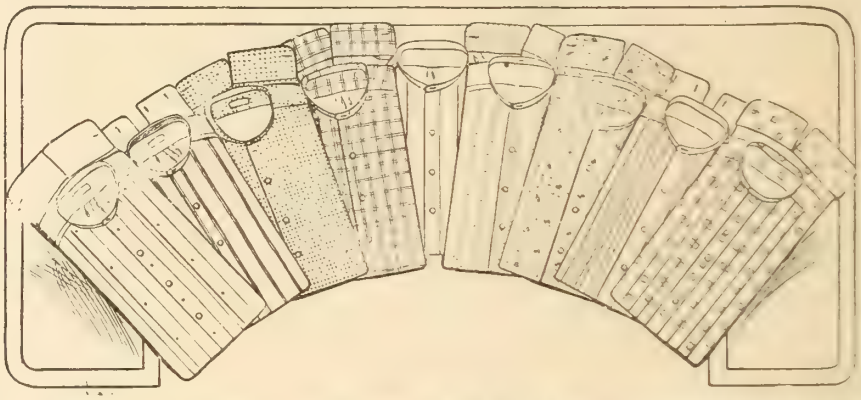
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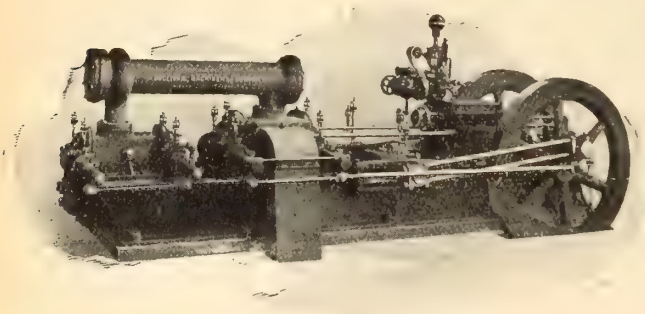
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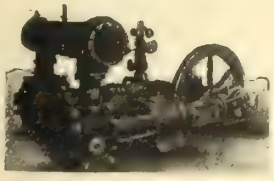
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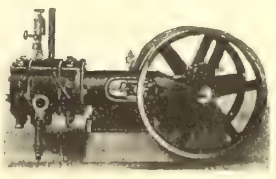
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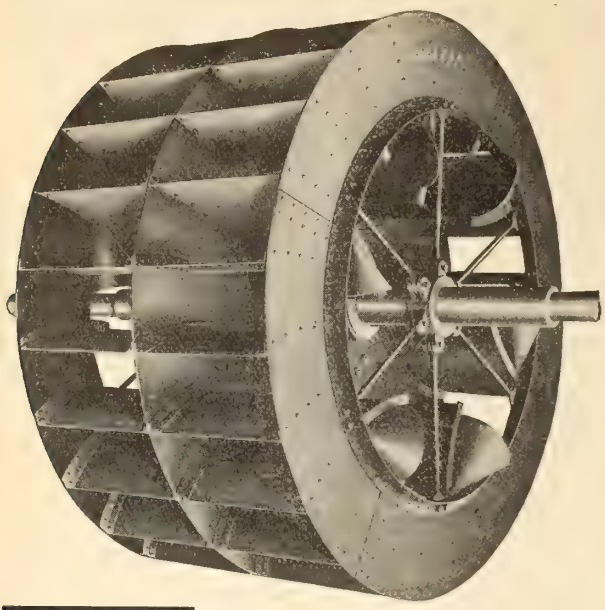
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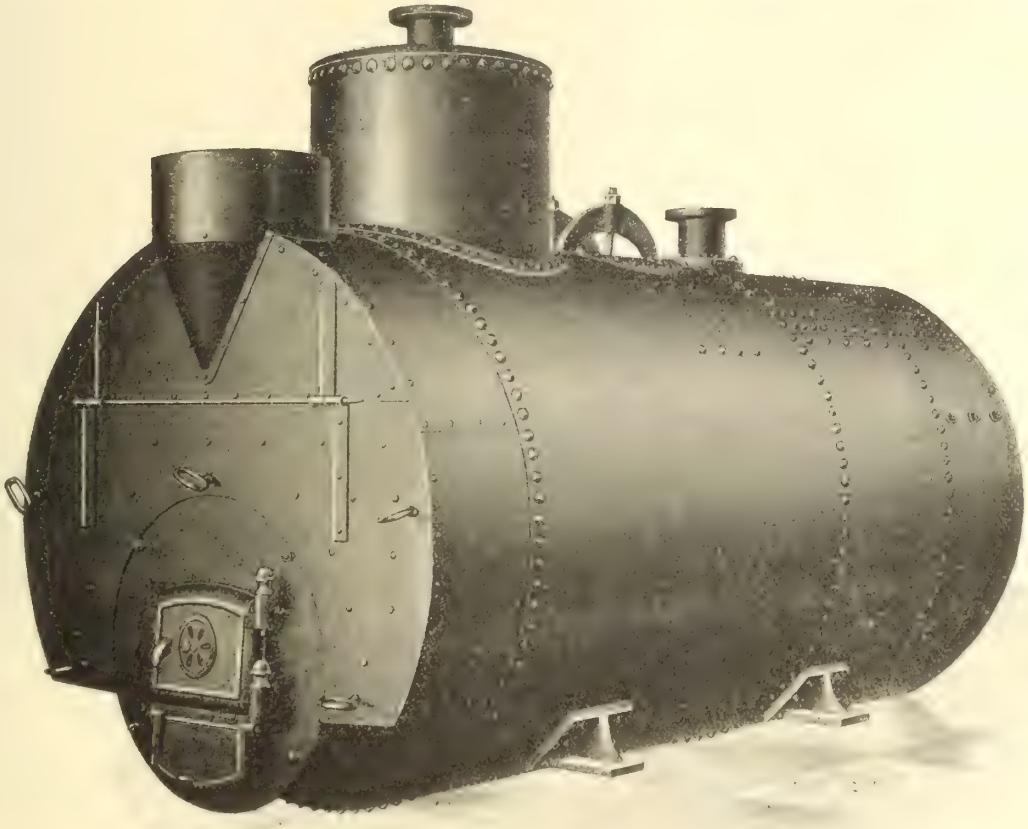
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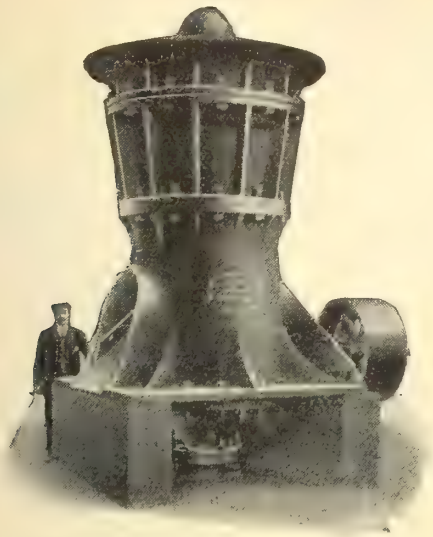
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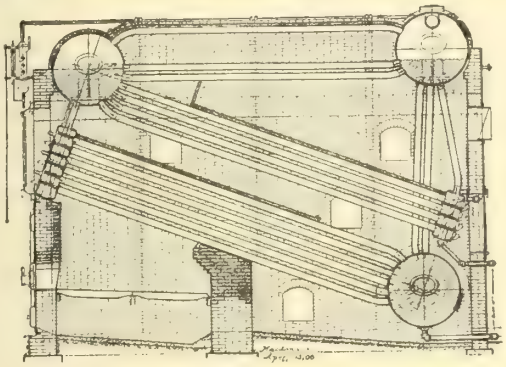
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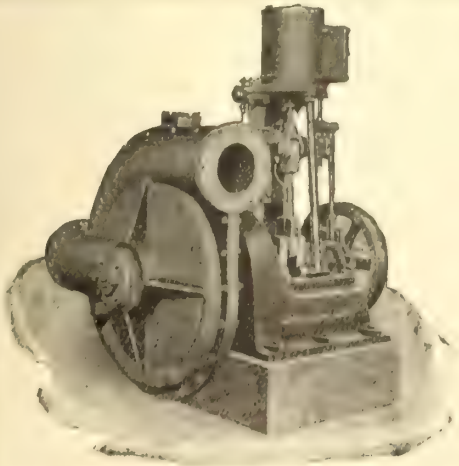
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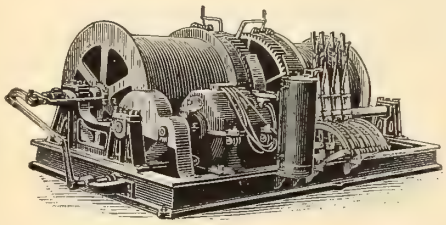
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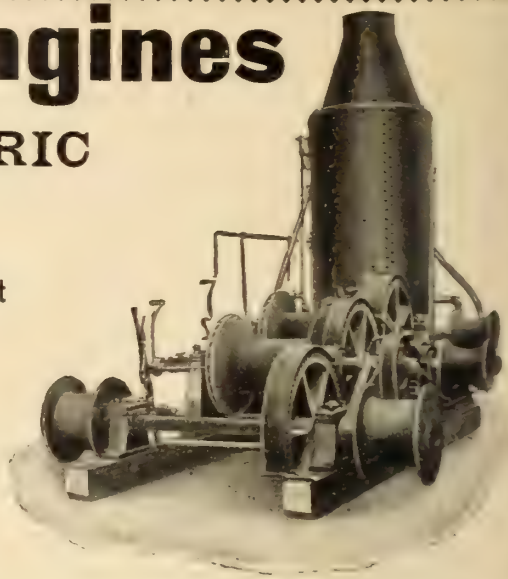
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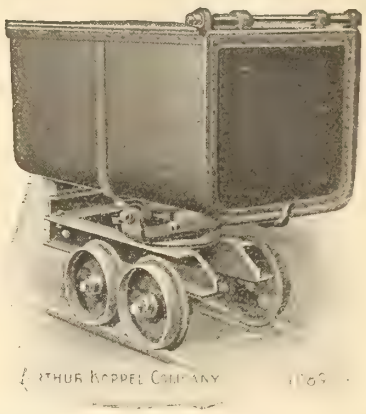
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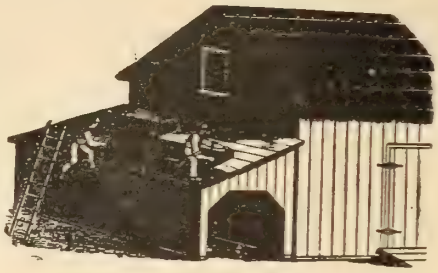
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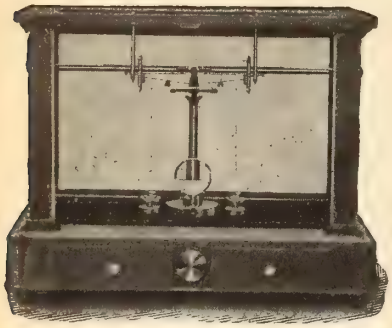
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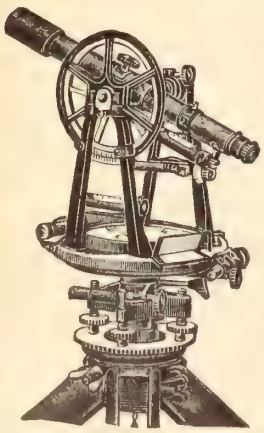
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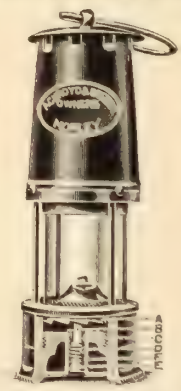
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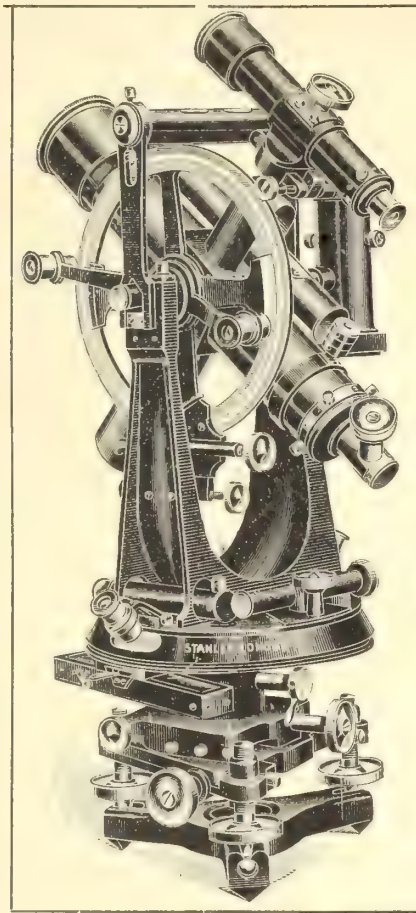
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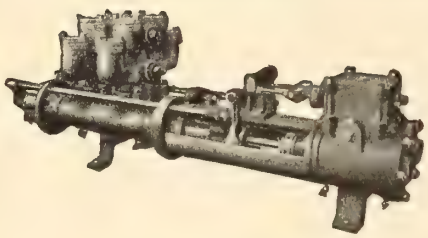
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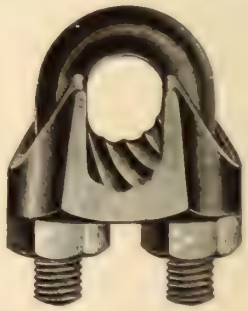
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO and MONTREAL, May 15, 1908 No. 10

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of THE CANADIAN MINING JOURNAL were printed and distributed, or an average of 3,822 per issue.

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THE DATA OF GEOCHEMISTRY.

T. Sterry Hunt, whose monumental labors on the chemistry of geologic phenomena were the foundation of modern geochemistry, was a daring and brilliant adventurer in the realms of science. Posepny's monographs changed the current of geological thought in the last decade of the nineteenth century. The able and tireless Van Heiss added the fruit of his careful work early in this century. Meanwhile geologists, chemists and mineralogists on this continent and in Europe have published the results of special research in official bulletins, scientific periodicals, or in other forms.

Thus a vast bulk of geochemical data has appeared in papers, magazines, and pamphlets, over a considerable period of time. It is not incorrect, however, to state that since 1900 a far greater amount of accurate work has been reported than in any preceding corresponding period.

So important are many of the recent contributions to our knowledge of geochemistry, and so easy is it for excellent work to be crowded out of the field of our attention, that we are impelled to make prompt acknowledgment of the value of a monagraph just published by the United States Geological Survey. Under the title "The Data of Geochemistry," Dr. F. W. Clarke has gathered and correlated an astonishing amount of well-sifted, sound, information.

No mere compiler could have attempted this work. No mere academician could have made it a coherent whole. Dr. Clarke has drawn upon every available source. His foot-notes constitute in themselves a copious bibliography. The scope of the monograph is splendidly wide. Its details are full and accurate.

The sequence of subjects treated in Dr. Clarke's monograph is, roughly, this:

The Nature and Distribution of the Elements.
The Atmosphere.
Lakes and Rivers.
The Ocean.
Waters of Closed Basins.
Mineral Wells and Springs.
Voncanic Gases and Sublimates.
The Molten Magma.
Rock-forming Minerals.
Igneous Rocks.
Decomposition of Rocks.
Sedimentary and Detrital Rocks.
Metamorphic Rocks.
Metallic Ores.

The Natural Hydrocarbons.
Coal.

In that the volume before us has made existing data available to the reader, it has fully justified its preparation. More than this, whilst its author expressly disclaims any attempt at presenting an exhaustive monograph upon geochemistry, he has done something much more desirable. He has given us a readable book that is at once a complete work of reference, and a sufficient resume of the best modern thought upon a subject that hitherto has been beset with discouraging difficulties.

ST. LAWRENCE COAL TRADE.

Late in April five of the Dominion Coal Company's fleet of colliers suffered delay in Quebec harbor. Coal would have been delivered at Quebec to supply the local market had the Louise Basin not been blocked with ice. The local authorities apparently made no attempt to facilitate matters for the large colliers, although it is obviously their duty to aid in every possibe way.

The Dominion Coal Company is making an earnest attempt to take advantage of the early opening of navigation. Throughout the past winter an enormous quantity of coal has been banked at Glace Bay. Sixteen colliers are in their employ, and in the third week of April coal to the amount of 60,000 tons was on its way up the St. Lawrence. It is hoped that 1,300,000 tons will be carried to Montreal before navigation closes. Much depends upon an early start. Last year's shortage should not occur again.

It is quite evident that the Nova Scotian collieries are anxious and willing to rush deliveries. In this they should be assisted.

ROSSLAND.

News from Rossland gives continued hope that mining in the South Belt will develop into a substantial mining camp. Much of the ore so far encountered is rich. The auriferous lead-silver ore, of which light shipments have been made from several prospects, is reported to range from $30 to $70 per ton. Prospectors are actively taking up areas and many properties are being worked on lease.

It were mischievous to speculate as to the results of development. But the facts themselves are sufficiently encouraging.

ZINC.

The opening of the Canada Zinc Company's smelter at Nelson, B.C., will have a doubly beneficial effect upon the Slocan lead mines. Heretofore the lead smelters have penalized the zinc contents of ore. Now the zinc ores of the district will be provided with a ready market and zinc contents of the lead ores will no longer be considered detrimental.

COBALT—PRESENT AND FUTURE.

A year ago the atmosphere of Cobalt was filled with the fever (and ague) of perilous promotions. To-day Cobalt is a strenuous mining camp, working out its own salvation with quiet confidence.

By the great majority of those directly interested in Cobalt a boom in stocks is not desired. The recent brisk movements, excited by several spectacular discoveries, may or may not assume boom dimensions. If they do, then Cobalt will have another load added to a sufficiently sizable burden of capitalization. We sincerely hope that neither by manipulation nor by the ungoverned enthusiasm of a gambling public, Cobalt stocks will move heavenward. They are now resting on much solider ground than ever before. Artificial inflation means catastrophic collapse.

Public attention has been caught and held by recent rich discoveries. These are phenomena that will probably recur from time to time. There are and always will be persons anxious to take advantage of the excitement of the moment to unload worthless paper. The Canadian public should need no warning. But there is another aspect of Cobalt. A few weeks ago a meeting of the Cobalt Branch of the Canadian Mining Institute was held. About fifty mine managers, engineers, mill men and other practical workers attended and took part in the proceedings. The object of the meeting was to discuss concentration methods. In itself this is a significant fact. It marks the strongly progressive tone of the camp. Superintendents, who not many months ago were in charge of one or two holes in the ground, must now attack the knotty questions of ore-dressing. Amongst these operators the most general topics of conversation are not the merits of stocks, but the comparative efficiency of different makes of air drills, crushers, rolls, concentrating tables and all matters pertaining to the mining and treatment of ore.

The skill and care of the mine managers of Cobalt have imparted real value to shares in many of the older companies. The list of shipping mines is constantly being added to, and Cobalt is giving us performance in place of promise.

The future of Cobalt lies largely in the hands of technical men. The camp is assured a fair lifetime, even from present developments. But the intelligent application of technical experience in the selection of suitable mining and concentrating equipment, and in the economical generation of power, will prolong indefinitely the productive future of the district.

It is imperative that mine managers should keep thoroughly informed concerning improvements and changes in methods and machinery. The insufficiently posted manager is painfully apt to develop costly fads. To a few, complicated machinery appeals because it is complicated. Often the personal predilections of a member of the directorate carry more weight than the

recommendations of the superintendent. But the competent manager, upon whose shoulders falls the whole responsibility of failure, must be allowed to choose his own supplies, both of men and machinery.

One feature of life in Cobalt that obtrudes itself unpleasantly upon the visitor is the prevalence of the "blind pig." A moderate estimate places the number of these illicit liquor shops at thirty-five. In open defiance of the law the vilest liquor is sold day and night. As a consequence the proprietor of the "blind pig" usually a "fence" for the "high grader."

There may be difference of opinion as to extent to which "high grading" obtains in Cobalt. Those who have studied the question claim that large amounts of silver are daily disposed of. Whether the total is large or small is not our present theme; but it is certain that "high grading" would be practically eliminated if the "blind pig" did not exist.

The onus of these conditions cannt be thrust upon the Government. It behooves the citizens of Cobalt to do a little house-cleaning.

No reference to mining in Cobalt would be complete without mention of the excellent topographical and geographical map issued and distributed by the Ontario Bureau of Mines. It was compiled by Dr. W. G. Miller and Mr. C. W. Knight, and it has afforded untold help in development and prospecting.

MINING FLOTATIONS AND THE PRESS.

The general report of the Grand Jury, which last December returned a true bill against Frank Law, refers in the following terms to the newspaper practice of printing any and all mining advertisements that are offered:

"We have heard sufficient evidence to convince us that the public have been swindled out of large sums of money in the flotation of mining companies. The prospectuses issued by many of these companies are not only intentionally misleading, but oftentimes false and fraudulent in the statements contained in them. The mining industry is destined to assume large proportions in Canada and in Ontario, and it is very much in the public interest, as well as in the interest of private individuals, that it should be conducted honestly and in such a way as to inspire confidence at home and abroad.

"The flotation of wild-cat propositions depends largely for their success on advertising in the daily press, and it is a regrettable fact that the newspapers do not caution the public in regard to ventures many of which are illusory and fraudulent on their very face. If the newspapers cannot be held responsible for aiding and abetting this kind of fraud, the Government should at least see to it that the laws are made wide enough to include fraud of all kinds perpetrated by the officers of the companies, and the brokers concerned, and furthermore that such laws are rigorously enforced."

SUMMER EXCURSION OF THE CANADIAN MINING INSTITUTE.

Plans for the visit of representatives of British technical and scientific societies are being perfected. Delegates have been invited from the Iron and Steel Institute, the Institute of Mining and Metallurgy, the North of England Institute, the South Wales Institute of Engineers, the Institute of Scotland, and the Manchester Geological Society.

Already a number of these representatives have signified their intention of coming over to Canada in August. Fifty provisional acceptances have been received by the secretary of the Canadian Mining Institute.

The proposed itinerary of the trip is printed on another page of this issue. It is, of course, open to change and has been suggested merely as a working basis. Indeed, the itinerary is now printed in the hope that those interested will give their opinions as to necessary modifications.

THE FRANK LAW CASE.

Anxious enquiries have reached us at divers times regard the progress of the case of Rex. vs. Frank Law. Rumors have been circulated that the case has been settled or dropped. These are utterly unfounded. County Crown Attorney Drayton consented to traversing the case until the June Sessions in the hope that Russell, Law's partner, would be extradited before that time.

The case is now "sub judice" and comment is out of order. The public may rest assured, however, that proceedings have not been and will not be dropped.

The finding of the Grand Jury reads thus: "That Frank Law, at the City of Toronto, in the County of York, in the year of our Lord one thousand nine hundred and seven, did unlawfully, fraudulently, and deceitfully combine, conspire, confederate, and agree with William Lockard Russell and with other persons to your jurors unknown to defraud the public market price of price and shares publicly sold, and did thereby commit an indictable offence, contrary to the provisions of the Criminal Code."

Contributors who send us photographs will do well to remember that a dull finish is difficult to reproduce. Good half-tones can only be secured from a "burnished" photo.

MINERAL LOCATIONS ON MORESBY ISLAND—ONE OF THE QUEEN CHARLOTTE ISLANDS.

(Abstract of Bulletin No. 1, issued by the British Columbia Bureau of Mines.)

The Queen Charlotte group of islands lies between the 52 and 54th degrees of north latitude and about 85 miles westward of the mainland, at the mouth of the Skeena river. The distance from these islands to the nearest of those islands lying adjacent to the coast of the mainland is from 60 to 70 miles across an open stretch of water—Hecate straits—sufficiently open to the Pacific ocean to share its waves and winds. This has proved enough of a barrier to prevent much intercourse by small boats between these islands and the mainland, while, until within the past year, communication by steamer was only to be had once a month. These islands, so commandingly situated off the main coast, have therefore remained sufficiently terra incognita to stimulate the imagination and create much interest.

The outline of the west coast of the islands, as shown on the Admiralty charts, is from a rough survey made by Vancouver in 1793, while cruising along the coast in a sailing ship. The east coast line is a little more accurately marked, as this was investigated in 1878 by the late Dr. G. M. Dawson, of the Geological Survey, who made a rough reconnaisance survey, the comparative accuracy of which, though a tribute to that wonderful explorer, still leaves much to be desired.

Historical.

The early voyages of discovery to the vicinity of the Queen Charlotte Islands, and in fact the entire northern Pacific coast, were all in search of a supposed northern passage for vessels from the Atlantic to the Pacific Ocean—in other words, a short waterway from Europe to China.

As early as 1592 the Spanish Viceroy of Mexico fitted out an expedition for this purpose under Juan de Fuca, who sailed as far north as Vancouver Island, although it is not known that he ever reached the Queen Charlotte Islands.

In 1639 the Court of Spain appointed Bartholemew de Fonte to command a squadron, fitted out in Peru, which sailed in 1640. In June, 1640, he records entering an archipelago of very many islands, called by him St. Lazrarus, in latitude N.53 degrees—the latitude of the centre of the Queen Charlotte group — and that he sailed for many leagues through intricate channels between islands. These may have been the Queen Charlotte Islands, but some doubt has been entertained as to the accuracy of both these early voyagers.

In 1774, Juan Perez, in the Spanish corvette "Santiago," saw and named the north cape of Queen Charlotte Islands Cape de S. Margarita, but, finding no anchorage, did not land.

In 1775, another Spanish expedition, under Bodega and Maurelle, coasted along the shores of the islands, but did not land.

In 1787, Dixon, in the British ship "Queen Charlotte," spent over a month on the coast of the islands, tracing the west coast from the north to the south end and sailing up the east coast as far as Gumshewa Inlet, and named the group of islands after his ship. He traded with the Indians, buying furs, etc., the real object of his voyage.

During the next few years the islands were frequently visited by fur traders in British, French, Spanish and American vessels.

In 1792, Capt. George Vancouver, in H.M.S. "Discovery," arrived on the west coast of America, and during the next three years was engaged in a series of surveys and explorations which to-day form the basis of our present charts of the west coast of these islands.

Attention seems to have been withdrawn from the islands with the abandonment of the search for the "Northwest Passage," until 1852, when H.M.S. "Thetis" visited the islands on a surveying expedition, followed, in 1853, by H.M.S. "Virago," and by H.M.S. "Alert" in 1860.

"In 1852, the Hudson Bay Company despatched a party of men in the brig 'Una,' Captain Mitchell, to discover the locality from which several specimens of gold had been brought by the Indians. This was found to be on Gold Harbor, in Kuper Inlet, on the western coast of Moresby Island. The gold was found in a small irregular vein, which soon proved to 'run out' in every direction. The quantity of gold obtained by the expedition was considerable, but has been variously stated. The enterprise was soon abandoned, but the discovery for a time created quite a furore—the first gold excitement in British Columbia—and the locality was visited by a number of miners, but with no further success."

As to the amount of gold actually obtained in this first expedition, no very authentic account is obtainable; tradition makes it very large, but Major Downie, mentioned further on, who visited the locality a few years later on a similar errand, places the amount at $5,000.

In 1859, Major William Downie, a miner, with a party of 27, in a schooner, under Capt. Robinson, went to Gold Harbor, and he records in his book "Hunting for Gold" that the party found quartz but no amount of gold. They "examined the spot where a large quantity of gold had been taken out some time before, but could not find anything worth working." Major Downie, however, reports that he found coal on Skidegate Inlet, and he is the first to have mentioned its existence on the islands. He, however, did not follow up his discovery, but soon left for the mainland.

In 1862 the "Queen Charlotte Mining Company" was formed in Victoria, and a party of men under Mr. Francis Poole—an Englishment, claiming to be a mining engineer—was sent north, landing on Skincuttle Island in the inlet of that name, on which island and the adjoining island, Burnaby, they remained until 1864, engaged in prospecting. Their prospect shafts, etc., are still visible to-day and have been re-staked by present-day prospectors, more, it seems, on their historic fame than on the amount of mineral visible. Mr. Poole gives an account of his expedition in a book, "Queen Charlotte Islands," published in London in 1872.

As far as is known, this constitutes the sum of the recorded early prospecting ventures on the Queen Charlotte Islands. That there have been some unre-

corded ventures is evidenced by the fact that at Copper Bay, some nine or ten miles south of the Sand Spit, there is the remains of an old shaft, now being unwatered and cleared out, which has been proved to be at least 100 feet deep, and of which there is no record.

Despite the fact that the early prospectors had all found enough to indicate the probability of extensive mineralization on the islands, for many years these discoveries were not followed up and little or no serious prospecting took place. It was only when attention was focussed on this northern part of the coast, by the location therein of the terminus of a transcontinental railway, that the Queen Charlotte Islands again received attention from the prospector, and the more valuable discoveries that have been made have been all located within the last two years, many within the past year. The area found to contain mineral is so extensive that prospectors, having performed sufficient work on their respective claims to hold them for the year, have stopped at that and spent their time in trying to locate further mineral deposits.

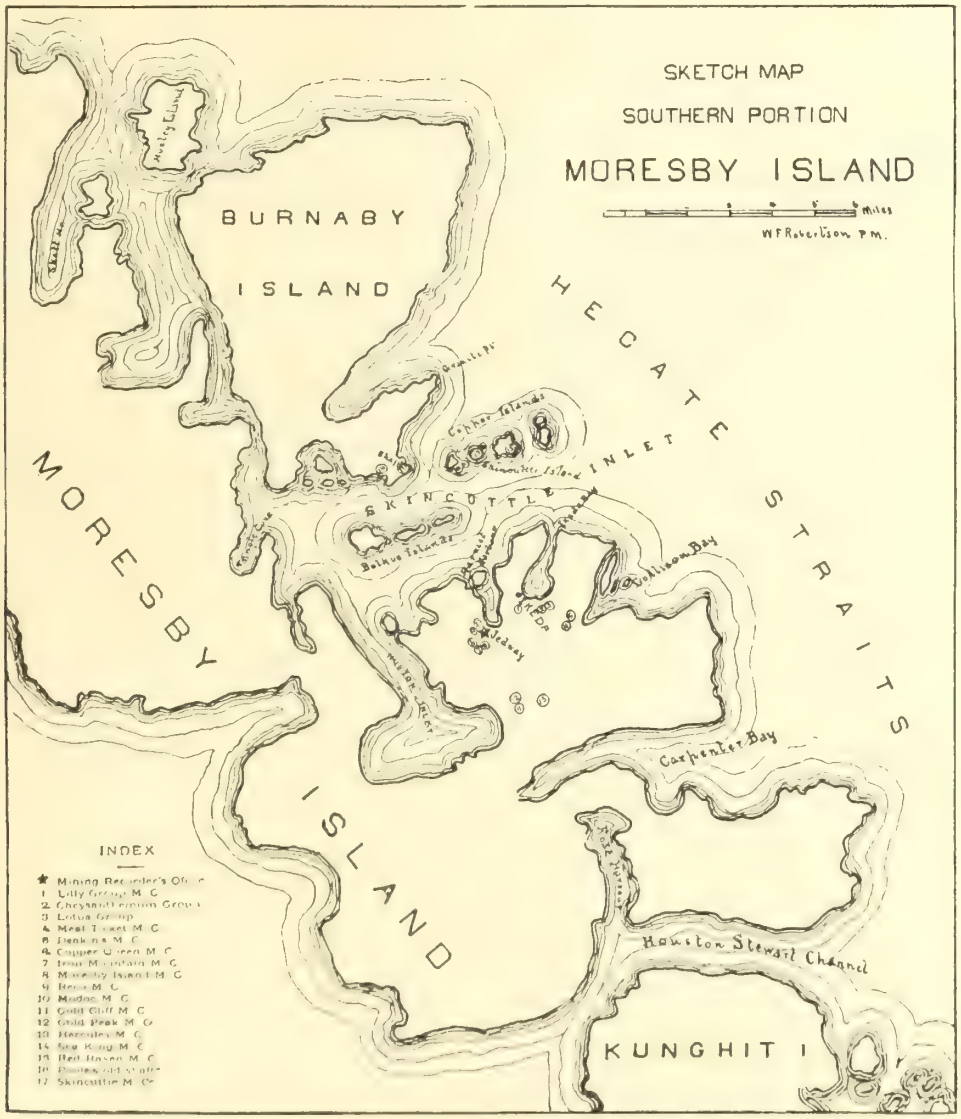
As a result, it was found on examination that, with one or two exceptions, there were to be seen only surface prospects, of which no very definite future can be foretold.

As was natural, when prospecting was resumed, it began in the vicinity of the indications found many years ago, and has proceeded along the "line of least resistance," that is, in the direction from the initial point which could most easily and safely be reached by small boats.

Skincuttle Inlet was the starting point, and the majority of the claims so far staked have been in the bays or harbors opening off this inlet, viz., Huston Harbor, Harriet Harbor, Ikeda Bay and Collison Bay, with a few, and, at present, not so important localities farther south.

From Skincuttle Inlet prospecting continued north, and some important locations have been made along the east coast from Klunkwoi Bay to Gumshewa Inlet, in a formation quite different from that found in the vicinity of Skincuttle Inlet. As yet, all the locations have been made close to the sea shore, within distances that could be reached in a day from a boat.

The formation, which has been found copper bearing, at Klunkwoi and Gumshewa Bays, appears to continue N.W., parallel to the length of the island, and is again found on the north end of Moresby Island, an Skidegate Channel, between the Narrows, where also it is impregnated with copper, but whether the metal is here in commercial quantities has not yet been demonstrated.



Climate.

The climate of Moresby Island is particularly favorable to prospecting and to subsequent mining operations, since in summer it is never very warm, while in winter there is seldom snow or frost in the lower lands, although both are to be found on the higher mountains, the highest peaks retaining snow caps well into summer.

The west coast of the island is always dangerous to approach owing to the rocky character of its shores and the prevailing west wind, causing an ever-present ocean swell, which renders landing from a small boat very difficult except in the sheltered bays, and these bays, though quite numerous, are still uncharted and unknown save to a few prospectors, who have bought their knowledge by hard experience.

The east coast is in summer usually safe, as it is protected from the west wind by the main island, and the fringe of smaller islands along its shores affords some protection, and offers ample refuge, from all winds, the inner passage being always navigable for small boats.

The warm winds off the Pacific, striking the high mountainous backbone of the island, produce in winter a great deal of rain and in summer a mist, which, however, seldom develops into fog.

As compared with the shores of Vancouver Island, those of Moresby Island are comparatively free from troublesome underbrush.

The timber, though small for lumbering, is admirable for mining purposes, and is very plentiful, while the damp climate does away with the dangers of forest fires.

There is little soil to hamper prospecting, the surface being, however, heavily carpeted with moss.

Game.

Game on the island is unusually scarce, there being no deer, rabbits, or even squirrels, while grouse are not plentiful, which fact is strange, seeing that the natural enemies of these animals, the wolves, coyotes and foxes, are also unknown on the island. Bear are present, but not plentiful. There is no area in the province so well suited for a game reserve—the climate, topography, vegetation and position are ideal—and the island should be stocked and placed under reserve.

Nature has, however, somewhat compensated for the dearth of land game by the bonteous supply of fish found in the sea and small streams, and the clams, rock oysters, abalonies and other shell-fish along the sea shore.

Skincuttle Inlet.

As already remarked, the greater amount of prospecting that has been done an Moresby Island is in the vicinity of Skincuttle Inlet, which was in 1862 the scene of early prospecting. The general geological formation of almost all Moresby Island has been placed as Triassic by Dr. Dawson, with a possibility of some Carboniferous measures. Lithologically, the formation was originally composed of limestones, shales, etc., with heavy deposits of volcanic matter from some local point of issue.

On the lower end of Moresby Island, as seen in the exposures in the various harbors bordering on Skincuttle Inlet, whatever may have been the original formation, it has been subsequently subjected to such an upheaval, with the accompanying faulting and bending, and has been so cut by innumerable feldspathic dykes that no sign of the original formation was traceable. The dyke intrusions are so numerous and extensive as to form the greater part of the rock mass, the sedimentary rocks showing as patches, or isolated masses, without any apparent relation to the next.

The important part, however, is the existing mineral deposits rather than the geological formation, and from the number of mineral locations seen it would appear as though the whole promontory between Huston Inlet and Carpenter Bay was extensively mineralized, the locations so far made simply serving as an index to its general character. The first locations in recent years were made on the shores of Harriet Harbor, from which point prospecting extended to Ikeda Bay and Huston Inlet, and later to Collison Bay and Carpenter Bay.

The mineral claims examined in this vicinity during this trip were all within the area mentioned. Speaking generally of these claims the mineralisation is always found in the immediate vicinity of, if not in the actual contact of, limestone with one of the larger dykes and consists primarily of magnetite, with a greater or lesser amount of chalcopyrite and occasionally considerable pyrrhotite.

Ikeda Bay.

The Japanese firm of Awaya, Ikeda & Company, Vancouver, originally interested in the fishing off the Queen Charlotte Islands, has staked claims on all the hills surrounding Ikeda Bay, and this company was found to be the only concern on the island making any serious attempt at mining, employing 100 men, mostly Japanese, in mining, mining construction and prospecting the claims already staked.

At the inner end of the bay the company has erected a large and substantially built wharf, capable of receiving the largest of the coasting steamships. Connecting the wharf and the mine workings a 36 inch gauge tramway has been built, over which, on cars drawn by horses, the ore is brought down for shipment.

Lily Group.—While some development work has been done on all the company's holdings in the vicinity, the greater amount and all actual mining has been focussed on the Lily group, which consists of eight claims. The development work for the group has been performed on the Lily, upon which the most available outcrop appeared. The outcrop showed up in a small creep, the water of which had washed clear an outcropping of magnetite carrying chalcopyrite. This outcrop occurs in places along the actual contact and elsewhere near the contact of limestone and an igneous rock, apparently a diorite, there being evidence of much movement and some faulting. This deposit, as is the nature of such deposits, does not assume the characteristics of a fissure vein, and is not very clearly defined, nor is it of uniform width or tenor of copper.

The development consists of what is called No. 1 tunnel, which is really an open cut in the creek bed along a contact of limestone and diorite, much altered, along which is a deposit of magnetite with copper pyrites; this has been exposed by the work done for some 30 or 40 feet, and has a width of from one to two feet. It would be difficult to estimate the copper contents of the exposed ore body, as this mineral is far from uniformly disseminated throughout the lead, occurring in bunches of quite rich ore, again scattered through the ore body, while in places the magnetite is practically barren.

Some 400 feet farther down the creek is the No. 2 tunnel, and here most of the development work has

been done, and all the mining, some 700 tons of copper ore having been shipped from this opening in 1907, assaying about 9 per cent. copper, 3.5 ounces silver, and 0.25 ounces gold to the ton. This tunnel had been driven in on the strike of and following the vein for some 160 feet in a S. 10 degrees E. direction. For the first fifty feet the ore has been stoped out up to the surface, the hanging wall, dipping at an angle of about 80 degrees, being supported by timbers, although in the tunnel proper no timber is required. The tunnel is about ten feet wide, and in places the vein-matter occupied pretty well the whole face of the drift.

In the latter part of August the face of the drift was not in ore, the vein having been temporarily lost, but when the property was again visited about two weeks later, it was found that a cross-cut had been driven to the left, towards the hanging wall, in which the vein had been again found and the main drift was being deflected to pick it up.

The ore from the tunnel is run out on cars and dumped on to an incline, at the bottom of which is a picking shed, where the ore is broken and hand sorted, the sorted ore being sacked and run down to the dock on cars drawn by horses, a distance of little over a mile, in which distance there is a drop of about 300 feet. On each car two tons of ore are carried, and one horse is required to bring back the empty car; a driver takes down two cars at a trip.

All the work about the mines is performed by Japanese. The miners working "single handed" are very efficient and compare favorably with the average white miner at this class of work, but the timbermen work very slowly.

There were employed in actual mining operations:— At No. 1 tunnel, about 14 men; at No. 2 tunnel, about 12 men; at No. 3 tunnel, about 8 men.

Chrysanthemum Group.—The same company has also staked out the Chrysanthemum group of eight claims viz.: Peony, Chysanthemum, Rose, Violet, Cherry, Apricot, Bamboo, and Maple mineral claims. This group is located on the southwest side of Ikeda Bay, at an elevation of about 400 feet above, and about half a mile back from the sea; the approach being a gradual slant. On the Chrysanthemum mineral claim there is a large exposure of mineral, some 50 feet long and 20 feet wide and about 15 feet high, consisting of four feet of nearly solid magnetite, with a small percentage of iron sulphide, between defined walls of diorite, and dipping nearly vertical, with strike north and south.

Lying adjacent to this, and to the east, is a zone of from four to eight feet wide of magnetite of a much finer grain, but not as pure, being considerably impregnated with iron pyrites and some copper pyrites. The amount of sulphide in this latter zone is so high as to render it valueless as a commercial iron ore, whereas, as far as developed, the percentage of copper is too low to be profitably worked.

On the Rose mineral claim, of the same group, there is naturally exposed in a bluff a mass of magnetite which, on the surface, is some 20 feet high and 50 feet long. This occurs along a diorite limestone contact, the ore lying horizontal underneath the limestone. In the limestone there is a cave, which was followed in, and up, for over 50 feet, formed by the leaching of a stream of subterraneous water, and in this there is considerable hydrated iron oxide.

Speaking generally, the explorations made indicate that the group contains a great deal of mineralization, masses of magnetite of undetermined sizes, all carrying an appreciable percentage of sulphides of iron and copper, but in no instance has copper in marketable quantity been discovered.

Lotus Group.—The Lotus group, consisting of six mineral claims and also owned by the Awaya-Ikeda Company, is located on the southeast side of Ikeda Bay, about half a mile back from the shore and at an elevation of some 500 feet above the sea. The mineral here exposed is pyrrhotite, the magnetic sulphide of iron, of which a very large body has been exposed with comparatively little work. This exposure is about 20 feet wide and is visible for a height of 20 feet, while 15 feet more depth of mineral is reported as covered by the dump made in the work done. This mass of mineral is bounded on either side by diorite country rock, the contact of which with the pyrrhotite is not sharply defined, but a gradual replacement. Included in the mineral mass are bunches of limestone, although solid limestone formation was not visible. A sample made up of fragments broken from the various large pieces of mineral on the dump assayed three quarters of one per cent. of copper, with traces of gold and silver; while an average sample broken from the exposed face assayed: Copper, 0.4 per cent., with traces of gold and silver. The work done on the group was also more of an exploratory nature than development work, and while the great mass of mineral exposed has no present economic value, it strongly emprasizes the extensive mineralization of the vicinity and encourages further exploration of the group and its surroundings.

Collison Bay.

Collison Bay lies next to Ikeda Bay to the southeast and is separated therefrom by a range of mountains forming a narrow neck of land running out into Skincuttle Inlet.

On August 26th, a gasoline launch was taken from Ikeda Bay around to Collison Bay, but, unfortunately for the writer, the prospectors interested in claims there were absent from their claims and cabins, and it was with some difficulty, and much uncertainty, that the various claims mentioned were found; therefore, it is quite possible that there may be some confusion in the names of claims seen and that some of the workings may have been overlooked.

Meal Ticket.—The Meal Ticket mineral claim and the adjoining claim, the Cash Box, are located on the north side of Collison Bay, about 280 feet elevation and about one third of a mile back from the water. The claims are reported as located by R. J. Leckie in October,1906. On the Meal Ticket a tunnel has been driven about 33 feet, and at 21 feet in cuts obliquely a four foot lead of pyrrhotite, which continues on the left side of the tunnel to the face. The tunnel having been deflected to the right where the mineral was struck, has consequently not cut through the lead, and the thickness of the lead must be inferred from its outcrop on the surface, to the left of the tunnel mouth, at which point a fault plane is observed, along which the lead has been shifted a couple of feet north and its continuation to the east is seen in the dump in the mouth of the tunnel. A general sample of the pyrrhotite exposed was taken and assayed less than half of one per cent. copper, with traces only of gold and silver. The country rock in the vicinity of the tunnel is very much altered volcanic rock, probably originally a diabase.

(To be continued.)

COBALT—PRESENT AND FUTURE.

(EDITORIAL CORRESPONDENCE.)

Four and one-half years have come and gone since the first announcement of the discovery of valuable ore in the Cobalt district. The first authentic information, based upon letters from the Provincial Geologist, was made public in November, 1903. In the autumn of 1904 the Temiskaming and Northern Ontario Railway was running trains into Cobalt, and by the end of the year 190 tons of high grade Cobalt silver ore had been shipped to the smelters.

That the Ontario Bureau of Mines fully appreciated the importance and promise of the new camp is evident, for in the spring of 1905 swarms of prospectors were supplied with accurate geological maps of the district, along with full descriptions of the minerals and of the local conditions. Moreover, travellers were landed in the very heart of the camp in Pullman cars.

A protracted stock jobbing boom began in the summer of 1905. Within two years companies were incorporated and floated with a total capitalization of $212,186,000. Most of these were hopeless wild-cats, schemes designed only to enrich the promoters. Nevertheless the public were bitten, bady bitten. In those days Silver Bird picked the shekels out of willing hands. Cobalt Silver Mountain blossomed and died, Big Ben boomed and "busted," and a horde of possible promoters waxed fat. Their hectic promises they exchanged for coin of the realm.

The year 1907 saw the inevitable reaction. The temporary wave of depression assisted in discrediting Cobalt with the public. The fact that steady progress was being made in the camp itself was unknown or ignored, and investors developed a thorough-going aversion to the very name of the district. However unfortunate this may have been, it was not unmixed with good. Cobalt, left to itself, settled down to work. Mine after mine was added to the shipping list, power plants and mine equipments were ordered and installed in rapid succession, and, today, Cobalt is an industrious camp.

The significance of this progress may be gauged by the following tabulated statement and by other facts adduced below.

1904. Number of shipping mines, 5; tons of ore shipped, 191; total value, $136,217; value per ton, $713.

1905. Number of shipping mines, 17; tons of ore shipped, 2336; total value, $1,485,570; value per ton $636.

1906. Number of shipping mines, 19; tons of ore shipped, 5,836; total value, $3,573,908; value per ton, $612.

1907.Number of shipping mines, 29; tons of ore shipped, 14,851; total value, $5,900,000; value per ton, $411.

For the first three months of 1908, the shipments amount to 4,490.49 tons, the estimated value of which is $2,300,000, or an average of $512 per ton. It will be noticed that the average value per ton shows an increase over 1907. Although much ore was shipped last year, yet it was diluted with heavy shipments of low grade ore. One factor in the enhanced value per ton during the past quarter, is the shipment of concentrates from the mills now in commission. With the addition of new concentration plants the value per ton of the year's shipments will naturally be higher. The same consideration makes the increase of tonnage during the first quarter of the current year all the more significant.

Geological.

The most prominent minerals of commercial importance are native silver, smaltite and niccolite, all associated with a calcite gangue. The sulphides, arsenides, and antimondies of silver also occur, sometimes in considerable quantities. As a rule the veins are small, ranging in width from a fraction of an inch up to, in exceptional cases, two feet. Many of these veins, of all widths within the limits mentioned, are phenomenally rich. They are vertical or nearly so. The country rock, whether conglomerate, slate, diabase, or Keewatin-complex, is hard and compact. Only in rare cases is there any appearance of a crushed zone.

Some of the veins are associated with a fractured zone on either side. In these cases the mineral enrichment has penetrated in minute cracks and veinlets to varying distances. There are instances where the enrichment has extended from eight to ten feet from the main vein.

On all the more important properties several veins heve been formed. The map prepared by Dr. W. G. Miller and Mr. C. W. Knight and issued by the Bureau of Mines shows more than 200 veins in 51 claims. Of these veins, 145 are in the conglomerate, 14 in the diabase and 15 in the Keewatin-complex. It is not well to dogmatize as to the relative importance of these formations; but, after study of their field relations, these facts are significant.

Mining.

The rock encountered in the mines of Cobalt makes hard drilling; but breaks well. Often it is "blocky." Cross-cut and drift walls stand well. No timbering is required except, of course, for shafts, chutes and floors.

In the early days the rich ore was grubbed out in any fashion from underhand surface stopes, the methods bearing as little relation to standard mining as cashing a cheque has to working for wages. Now, however, properties are being opened up in good form.

A remarkably small amount of stoping has been done in the better mines. In some cases large dividends have been paid from the proceeds of ore won in shaft-sinking and lead-stopes. This, perhaps, is the most remarkable feature of the camp.

Most of these mines are waiting for the erection or completion of their concentrating mills. The need of facilities for concentration lies primarily in the fact that many of the vein have associated with them small but visible veinlets of rich material that cannot be recovered from the broken rock by hand-sorting. Mechanical treatment is therefore a necessity. But the pay ore is not confined to the rock carrying these veinlets. Much of the country rock is enriched by microscopic veinlets and segregations. This will require fine crushing and cyaniding.

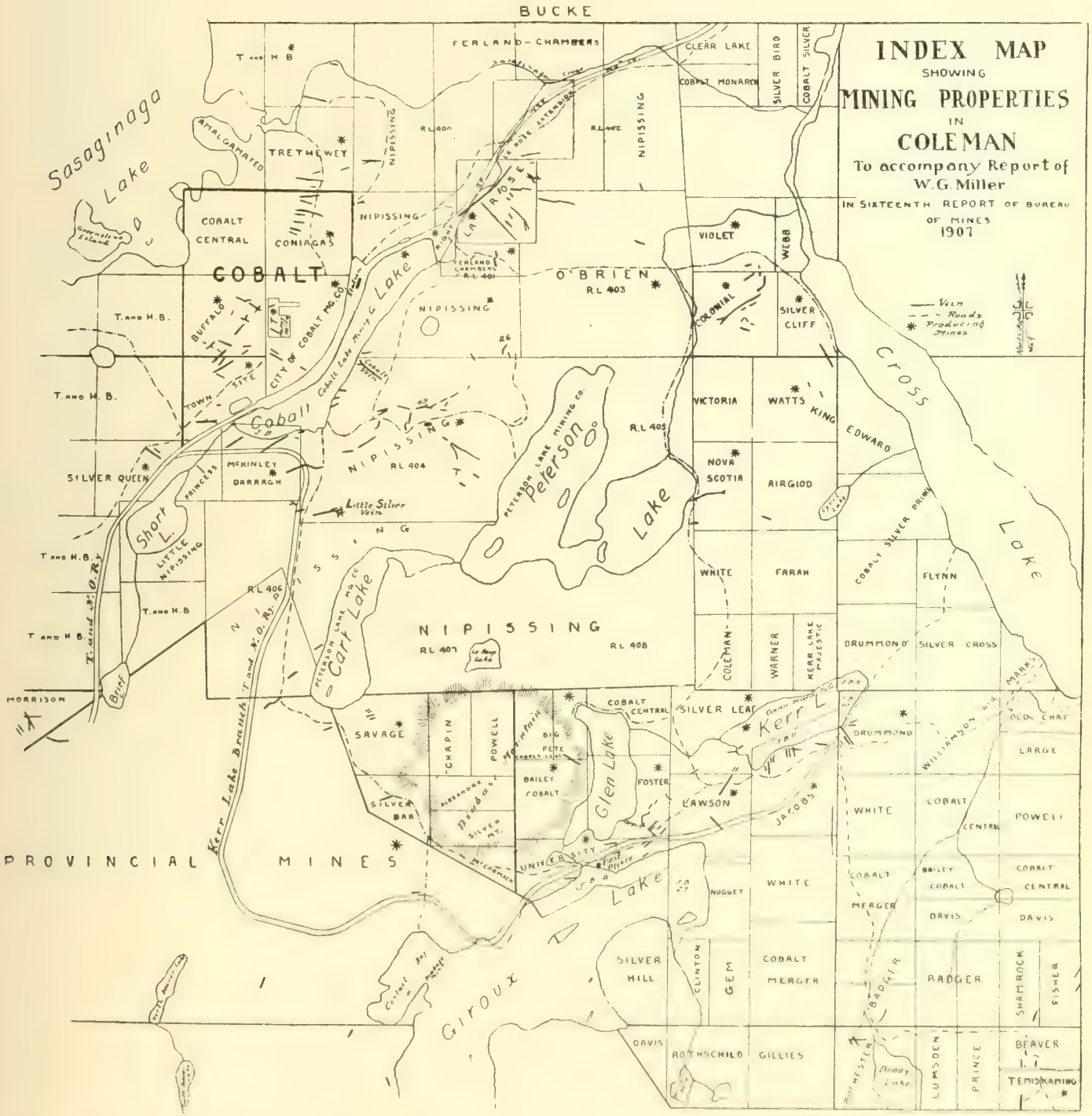
All the larger mines are working on these problems. The three mills now in operation are tentative in design—experiments on a large and practical scale. Standard designs will be the result of experience and can only be arrived at after patient investigation. But it is recognized that the whole future of the camps depends upon the successful solution of the milling prob-

lem. Rich ore is pleasant enough when encountered; but it does not make a mine. Although Cobalt is a high-grade camp most of the high grade ore is diluted in mining with a relatively large tonnage of milling rock. So the production of the camp is increasingly dependent on its milling capacity.

What the term "high-grade" means can be understood when it is explained that ore assaying less than 1,500 ounces of silver per ton is known as second grade ore. Shipments averaging more than 1,500 ounces per ton have been made. Single car loads have netted the shippers as much as $150,000 and there are pay shoots in the camp that will net $800 per cubic foot. These, however, are by no means the rule. One has but to refer to the annual average value per ton of ore shipped to see that the rich shipments are offset by much material that leaves but a narrow margin of profit, after freight and smelter charges have been paid. This last consideration illustrates the immediate need of more concentrating mills.

Market.

There are now at least eight buyers of the high grade ores produced in Cobalt. Two of these have treatment works in Canada—the Orford Copper Company at Copper Cliffe, and the Deloro Smelting and Reduction Company, at Deloro, Ont. A third Canadian plant, that of the Coniagas Smelter Company, situated at Thorold, Ont., will soon be in running order. In the early days payment was made only for the silver contents, but now arsenic and sometimes cobalt are paid for. For special cobalt and arsenic ores a limited demand exists in Europe and this market is being slowly opened.



Labor.

There is this spring an overplus of workmen. Unskilled laborers predominate. Trained miners are all too scarce. The superintendents and foremen, consequently, have to do much teaching. Naturally this is a condition that time will remedy. Inefficient and untrustworthy men are being weeded out. The camp is gradually attracting skilled miners and as these settle down the mining population of Cobalt will improve. The mine employees number about 2,500. Many nationalities are represented. Before the strike there were many of the best class of Nova Scotian miners. There are fewer now but almost every day the number is being increased. British Columbia and the Western States have contributed their quota. Finlanders, Poles, Austrians, Russians, Italians, and other lesser breeds make up the polyglot total.

The official wage scale of the Mine Managers' Association runs thus:—

Surface Labor.

Surface boss, per day	$3.25
Carpenters, per day	3.25
Carpenters' helpers, per day	2.50
Mechanics, per day	3.25
Pipefitters, per day	3.00
Head blacksmith, per day	3.75
Blacksmiths, per day	3.25
Blacksmiths' helpers, per day $2.50 or	2.75
Engineers, per hour,	.30
Firemen, per hour	.25
Head ore sorters one only at each shaft or ore house, per day	2.75
Ore sorters or cobbers, per day	2.50
Hand miners, per day	2.75
Teamsters, per day	2.50
Hoistmen, per day	2.75
Cage or bucket tenders, per day	2.25
Other surface labor, per day	2.25

Underground.

Timbermen, per day	3.25
Machine men, per day	3.25
Machine helpers, per day	2.75
Cage or bucket tenders, per day	2.50
Other underground labor, per day	2.50

Board will be charged at the rate of $4.20 per week or 60 cents for every day.

Working days shall consist of 10 hour shifts except on Saturday, when the total time shall be 16 hours, 9-hour day shift and 7-hour night shift.

Twenty-five cents per day extra to be paid machine men and helpers sinking in a wet shaft.

At a meeting of the Mine Managers' Association held on December 17th, 1907, the following amendments to the rules of the Association were passed:

"That the scale at present in force be adopted as a maximum scale until further notice, for adults over 21 years of age, and that contracts and bonuses be allowed, and that the rate for blacksmith helpers be $2.50 or $2.75 per day optional with the employer."

The mines are exceptionally dry and generally well ventilated. The pay is good, far better than obtains east of British Columbia. Theer is no general work on Sunday. Board as a rule is excellent and accomodation comfortable. In some cases the managements offer special inducements to married men in the way of assistance in building cabins and houses.

Places of worship there are in abundance. In the two schools there are 450 pupils registered. The average attendance is 350.

Briefly, Cobalt is, from the workman's point of view a desirable camp. It is improving. It requires only the abolition of the "blind pig" to render it a model of decency and decorum.

Equipment.

Steam plants have been installed in 80 properties, with a total boiler capacity of 8,408 horse power. There are two producer gas plants aggregating 425 horse power. Fifty-four air compressors capable of delivering in the aggregate 36,400 cubic feet of free air per minute are in commission on 44 properties. Three concentrating mills are in operation and two are nearing completion.

Plans are being matured for the development and distribution of power from Ragged Chutes on the Montreal river. By means of this or a similar scheme a large saving could be effected.

A majority of the mines co-operate in matters pertaining to labor through a central Employment Bureau, where record is kept of every man engaged or discharged.

General.

Topographically the situation of the mines of the Cobalt district is singularly beautiful. Dotted over knolls and hills, or on the margin of one of the numerous small lakes, the shaft houses and other buildings have commanding views. The custom of painting the name of the operating company on many an office or power house in letters large and legible has been followed—a boon of no small dimensions to the uninitiated visitor.

The actual producing area of the district is comprised in a rectangle measuring roughly 4 by 2 miles. The town of Cobalt, on Cobalt Lake, marks the centre of this rectangle. In many respects the townsite is excellent. The hill on which the town is built slopes gently towards the northwest side of the lake and affords good drainage. But the exigencies of hasty birth and rapid growth have militiated against a due regard for certain of the conveniences of civilization. The noxious incinerator and the malodorous garbage pile make pestilential appeal to the public nose whenever the thermometer rises above freezing. However, Cobalt is now an incorporated town with an enterprising mayor and council, clothed with the power of issuing debentures. It will not be long, therefore, before unseemly smells and offensive sights will be things of the past.

For the accommodation of the travelling public there are two fair hotels. Three Canadian banks have branches in the town. There is no licensed saloon, although the saloon being the least of three evils there well might be.

Both Haileybury and New Liskeard, respectively 5 and 10 miles beyond Cobalt on the T. and N. O. R. R. are residential towns. Many men whose business hours are spent in Cobalt take advantage of the excellent train service to have their homes in the two northerly towns. Toronto is only 330 miles away—a night's run on through Pullman sleepers.

Where two or three are gathered it is even betting that the unsurveyed district south of Larram is a point under discussion. It may therefore be well to conclude this hasty summary with a few words bearing in this new field.

The district, for which no distinctive and comprehensive name has yet been evolved, lies sixteen miles southeast of the town of Cobalt and from two to three miles west of lake Temiskaming.

Late in March of this year the district was visited by a contributor to the "Canadian Mining Journal," who looked over two properties upon which the bulk of the work had been performed. The Keeley (H. R. 19) is one of these and the Haileybury Silver Mining Company (H. R. 16) is the other.

The Keeley vein, two to six inches wide, is opened near the northwest corner of the forty acre lot. The vein has been worked by open cut to a length of forty feet and a maximum depth of fourteen feet. The strike of the vein is E. 28 degrees S. Massive smaltite and, possiblq cobaltite are present. Of wire silver, contrasting with the leaf-silver of Cobalt, there is a good showing. Quartz occurs in the gangue. About two hundred and twenty six bags of ore were ready for transportation.

On the property of the Haileybury Silver Mining Company the vein strikes S. 20 deg. E., dipping 70 degrees east, and is opened near the northeast corner. At the bottom of the forty foot shaft massive smaltite, associated with niccolite and a little native bismuth was found. Calcite, a chlorite, and pink feldspar make up the gangue. In places the vein is five to six inches wide.

Deep snow made close inspection of the district impossible. It is assumed, however, that the country rock of both veins belongs to the Keewatin series.

THE MECHANICAL EQUIPMENT OF THE OTTAWA MINT.

(A paper read before the Mechanical Section of the Canadian Society of Civil Engineers.)

(*Continued from May 1 Issue.*)

Annealing.—The blank annealing furnace is heated in the same manner as the one used for annealing the fillets; but the arrangements for passing the work through is different. The blanks are fed into the machine through

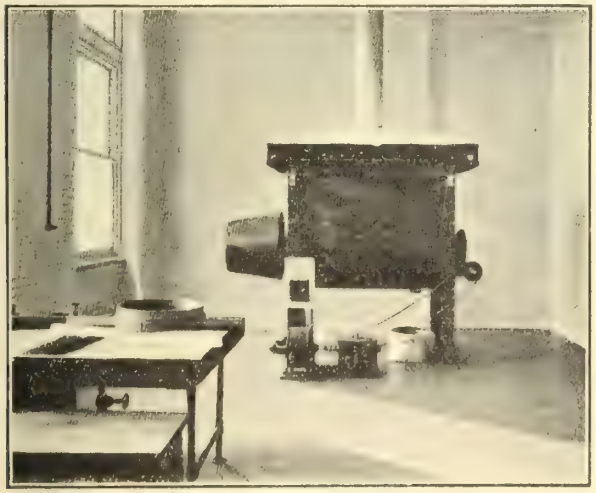


Fig. 15. Rotary blank annealing furnace and sawdust drying plate.

a sheet iron hopper. This hopper is attached to, and revolves with a cast iron hollow cylinder, on the internal surface of which is cast a hollow thread of very coarse pitch. The blanks follow this thread, moving forward slowly as the cylinder revolves, until they fall through an opening which communicates with a shute leading into a vessel containing water. The flame surrounds the cylinder, which is kept at a red heat during the process of annealing. The time taken by the blanks in their passage through the furnace is regulated in the same manner as in the fillet annealing furnace. The blanks are cooled before they come into contact with the air, and oxidation is thus prevented.

Blanching and Cleaning. After having been annealed, the blanks are cleaned in a weak solution of sulphuric acid; washed and dried; they are then ready to receive the imupression from the dies. The solution of sulphuric acid is contained in a copper tumbling barrel, which revolves at about 40 revolutions per minute, and is so designed that it can be tilted for filling and emptying. After treatment by the acid, the blanks are washed in tanks containing hot and cold water, and are then placed in the drying drum with beechwood saw dust. Beechwood is used for this purpose because it contains resin, or other ingredient likely to discolor the blanks or make them adhere to one another. The drying drum is hexagonal in section, the sides made of hard wood, and the ends and attachments of brass. This drum revolves at about 25 revolutions per minute, and the blanks and saw dust remain in it for about ten minutes. They are then tipped into a circular sieve, and shaken



Fig. 16. Tumbling barrel, drying drum, and washing tanks in Annealing Room.

over the hot plate. The mesh of the sieve is large enough to allow the saw dust to pass freely through the bottom, but small enough to retain the blanks. The hot plate consists of a flat sheet iron pan about 6 feet long,

4 fet wide, and with sides 6 inches high. It is supported on four iron legs, and stands about 3 feet 6 inches from the ground. Beneath the pan, and in close contact with it, is a steam coil, by means of which the saw dust is dried, and may be used over again.

Coining.—The coining presses, of which there are three, are of the type in which the pressure is given to

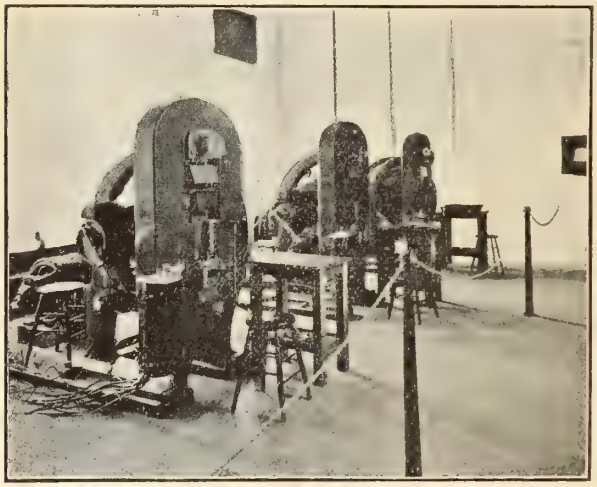


Fig. 18.—Coining presses.

the coins through levers and toggle joints. The hard steel knuckles of the toggle joints are of exceptionally large dimensions, so that coins can be struck at the rate of 100 per minute without any danger of them becoming overheated. Each press is driven by its own motor, and arranged so that the drive can be made either through a belt or gearing. The number of blows struck per

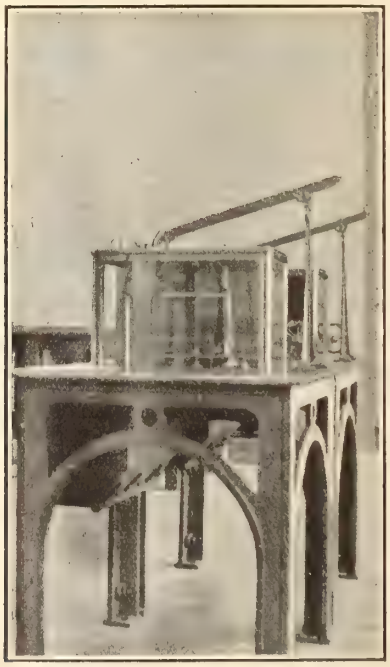


Fig. 18.—Automatic Weighing Machines,

minute can be varied from 30 to 100 by means of a 5-step controller.

The top and bottom dies move up and down, the collar plate remaining stationary. The blanks are placed They are fed to the dies, automatically, by steel feeding fingers, which take one blank at a time from the feed tube, and drop it into the collar, at the same time pushing the previously struck piece into the delivery tube. in the feed tube by the operator, in piles of about 30.

Hitherto, when coining, it has frequently been the case that, for some reason or other, a blank has not been placed between the dies at the proper moment. This may occur through the feed tube being empty, or through a bent blank sticking in the tube. In every case the dies have come together "clashed," and have been rendered useless. It has been known in a large mint for as many as 12 dies to be "clashed" in one day; representing a cost of not less than $22.00, over and above the time taken in changing the dies. As a general rule a pair should be capable of striking about 80,000 pieces before becoming unfit for further use. In order to prevent the possibility of "clashed" dies, a device has been adopted in these presses, by means of which the dies do not come together unless a blank has been placed bebetween them. This device consists of a special clutch between the fly wheel and the main shaft, which is actuated by an arrangement of levers connected with the feeding fingers. In the event of a blank not being fed to the dies, the clutch is released, and the column holding

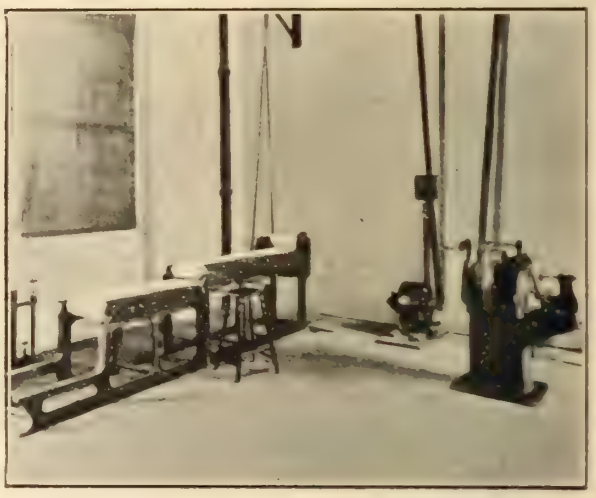


Fig. 19.—Overlooking and defacing machines in Weighing and Examining Room.

the top die is stopped instantly, at its highest point; the fly wheel continuing to run idle on the main shaft. This attachment takes up no extra floor space, and is exceedingly neat and effective. By its means also, single strokes can be made by the press; a very convenient arrangement, when setting a new pair of dies.
the delivery tube and delivered to a bowl placed in the front of the press. The finished coins are forwarded to the examing department, where they are subjected to various tests before they are issued.

Testing.—In the case of gold coins and 50 cent and 25 cent pieces, each one is weighed separately on an automatic weighing machine. The 10 cent and 5 cent pieces are weighed in groups, in a hand scale, against a standard dollar weight; while the 1 cent pieces are weighed, in a hand scale, against an avoirdupois pound, which should contain exactly eighty of them.

The automatic weighing machines are very delicate instruments, the weighing being so accurate that the beam, when fully loaded, will turn with .01 of a grain. Each machine will weigh 20 coins per minute. The coins are fed into a hopper by the attendant. One coin is then pushed automatically on to a flat pan attached

ta one end of the beam; where it remains for 3 seconds; after which it is pushed off by the succeeding coin. During the time it is resting on the pan its weight determines which one of the three shutes it shall drop into when it is pushed off. These shutes lead to three boxes; one for those coins that are to light, a second for those that are too heavy; while a third receives those that are of the correct weight. The latter are taken to the overlooking machine, where they are spread on a travelling band, and carefully examined. Any that are found to be discolored or otherwise imperfect are picked out. The band travels over rollers, and, on reaching one end of the machine, the blanks are turned over automatically, so that the other side of the coins may be examined.

All the gold coins, and the 50 cent and 25 cent pieces that have successively passed through the foregoing tests, are then rung, singly, on an iron block, to find if they have the correct ring, and are not "dumb."

Those coins which have been found to be light, or heavy, or "dumb," or discolored, or in any way imperfect, are destroyed in the defacing machine, and remelted. The defacing machine is of similar design to the marking machine, but whereas the grove in the disc of the latter is a plain one, that in the defacing machine is divided into a series of notches, so that the edges of the defective coins are notched all the way round.

The good coins are delivered to the office, where they are counted into bags by the telling machine. This machine automatically counts, and delivers into a bag, any number of coins, as required. When the desired number has been delivered, the machine stops, until the trigger is again pulled for the next bag. Any number of coins may be counted on this machine, form 100 to 2,000; and any size of coin, from 50 cents to 5 cents.

In addition to the machinery mentioned above, there are several auxiliary machines, for various purposes, throughout the coining department. Weigh bridges, for weighing truck loads of raw material; bullion balances, of various capacities, for weighing the metal during the processes of coining; automatic and hand trying cutter, etc.

For the storing of bullion the Mint is equipped with three strong rooms; one in the Mint Office, one in the Melting House, and one in the Rolling and Cutting Department. These strong rooms are fire and burglar proof, and are fitted with doors, each of which has four combination locks, controlled by triple time clocks, and arranged so that no door may be opened without the presence of at least two officials.

A refinery will shortly be erected in connection with the Mint, in which gold will be treated by the electrolytic process.

MANGANESE IN DEEP-SEA DEPOSITS.

Manganese, as oxide or hydroxide, exists in all deep-sea deposits, sometimes as grains in the ooze, sometimes as a coating upon pumice, coral, shells, and often in the form of nodular concretions with some other substance as a nucleus. The origin of these nodules is doubtful. Their derivation from the subaqueous decomposition of volcanic debris is the basis of the best substantiated theory. The nodules occur in close association with altered volcanic materials, and most abundantly in connection with red clay of similar origin. In composition the nodules vary widely, ranging from 4.16 to 63.23 per cent of manganese oxide.

STRIKE OF GOLD MINERS AT GOLDBROOK, N.S.

On December 18, 1907, the Great Bras d'Or Gold Mining Company, operating at Goldbrook, N. S., posted up the following notice at its mines:

On January 1st, 1908, the following scale of wages will go into effect at our mines at Goldbrook, N. S.:

Miners	$1.75
Muckers	1.50
Laborers	1.25
Engineers, 12 hours	2.00
Amalgamators, 12 hours	2.25

Board can be had at the company's cook house at $3.00 per week.

The company had been paying the miners $2.00 per day, but decided to reduce the wages upon being informed that this rate was 25 cents per day more than the other gold mining companies of Nova Scotia were paying. On January 1st, the miners told the manager that they would not work for $1.75 per day, and it was agreed to continue to pay $2.00 a day to the men who had worked as miners up to that date, but miners who were employed as such after January 1st, would be paid the new scale of wages. On February 20th, when the men received their monthly wages, one miner objected to being paid at the rate of only $1.75 per day. The company claimed that not having worked as a miner before January 1st, having been employed previously as a mucker or helper, he was not entitled to any more. On February 21, the employees made a written demand that the following schedule of wages go into effect at once.

Miners	$2.00
Helpers	1.75
Muckers	1.50

On being told by the manager that this request could not be granted, the men to the number of 22, left the camp, and were paid off the next day. Work was resumed at the mines on March 2nd, some of the old employees having returned at the $1.75 rate, while the places of others were filled.

PRUSSIAN GOVERNMENT COLLIERIES.

The Saarbrucken Collieries, operated by the Prussian Government, produce annually 10,000,000 tone of coal. The system of working is almost entirely the filling-up or stowing method. The introduction of this method has lessened the number of accidents from falls of roof and side materially. Within ten years accidents of this kind have been reduced from 1.54 per 1,000 to 0.61 per 1,000.

The washeries waste, boiler clinker, and other waste materials are flushed into the mine by a current of water in steel and cast-iron pipes. Along with this practice, the longwall system of working is being more extensively used. Timber is saved and the danger of mine fires is largely removed. In spite of this, the following equipment of rescue apparatus is held ready for use: 41 "Draeger" apparatus, 28 "Giersburg," 29 "Walcher-Gaertner," 12 "Neupert" pneumatophores, and 36 smoke masks of various types, together with 170 electric accumulator lamps.

The number of working days for the years 1905-6 was 299.9, the daily output per man, 0.778 ton. The colliery coal consumption was 1,390,747 tons, or 12.9 per cent. of the output.

NOTES ON FUEL ECONOMY AND ITS APPLICATION TO NOVA SCOTIA.

By A. A. Hayward, Halifax.

(*Continued from last issue.*)

It is only within a few years that large types of gas engines have been on the market. To-day the modern gas engine is the cheapest and most efficient power known. By the Mond producer process, about 15,000 feet of gas can be generated from one ton of coal, or 15 times more than by ordinary methods. This gas would have calorific value of 22,500,000 B.T.U. and a heating power of 26,400,000 B.T.U. Of this thermal heat an ordinary steam engine only succeeds in turning into useful energy about 6 1-2 per cent. or 1,616,000 B.T.U.; while a gas plant having a combined efficiency of 25 per cent. and a mechanical efficiency of 85 per cent. multiplied by 25 per cent. would secure in useful energy 21.25 per cent. at the engine shaft, thus showing an efficiency of nearly 300 per cent. over the ordinary steam engine. Mr. Byron Donkin says it has now been proved by experience that a good gas engine turns about double as much heat into work as a good steam engine.

In operating a modern gas producing plant of large unit, less than one pound of coal is required to produce one B.H.P.H., while to obtain the same results by a steam plant would require from 2 to 6 pounds, depending largely upon the size and kind of plant.

A series of tests made of gas producers and engines using 1 1-4 pounds of coal per H.P.H. show the yearly cost of operation a gas plant to be as follows:—

Coal at $3.50 per ton, cost of one horse-power..	$5.83
Coal at $4.00 per ton, cost of one horse-power..	6.67
Coal at $5.00 per ton, cost of one horse-power..	8.33

A further illustration of fuel economy is shown by a 500 horse-power plant used for generating electricity:—

500 horse-power unit.	
Fuel cost, per ton	$2.36
Consumption indicated horse-power, lbs.	.78
Consumption per kilowatt hour, lbs...	1.40
Cost of fuel per indicated horse-power hour	.04
Cost of fuel per brake horse-power hour	.055

Result of a test made by the United States Geological Survey of No. 2 Wyoming lignite:—

Hours of duration	30
Average power required to drive auxiliary machinery	16.4
Equivalent in pounds in dry coal per hour	51.2
Total dry coal used in producer during the test	10,968
Total refuse in coal	2,509
Total coal consumed	8,449
Dry coal consumed per hour in producer	365.3
Equivalent to dry coal used by the producing plant	416.5
B.T.U. from pound of dry coal	10,656
B.T.U. from dry coal as fired per hour	3,892,600
Total gas produced at 62 degrees and 14.7 pounds pressure	447,700
Total gas produced per hour	14,923
Total cubic feet pas per pound dry coal consumed in producer	40.9
Per pound equivalent dry coal used by producer plant	35.8
Average electrical horse-power available for outside work	184.8
Average electrical H.P. at switchboard	201.2
Brake H.P. developed at engine	236.8
Efficiency—	
Of conversion and cleaning gas	.58
Of producer plant	.50
Dry Coal Per H.P. Hour—	
Pounds consumed in producer per elec-horse-power available	1.98
Pounds consumed in producer per electric horse-power at switchboard	1.82
Pounds consumed in producer per break horse-power at engine	1.54
Pounds equivalent used by producer plant per electric horse-power	2.25
Pounds equivalent used by producer plant per switchboard	2.07
Pounds equivalent used by producer plant per break H.P. at engine	1.76
Composition of Coal—	
Moisture	9.44
Volatile matter	35.02
Fixed carbon	34.82
Ash	20.72
Sulphur	3.91

The remarkable results obtained at the fuel testing plant of the United States Geological Survey at St. Louis supply abundant material for serious thought. While the report may be understood by engineers and those accustomed to technical detail, these details are somewhat confusing and obscure to the ordinary layman. The accompanying scale of comparisons will assist in making the results fully understood (paper by Mr. Marius R. Campbell).

Seventy-two tests were made under practical conditions, and made from samples of coal ranging in quantity and moisture from the lignites of North Dakota to the best coal of Virginia and Pennsylvania. Among the noticeable features of these tests was the absence of smoke. The sulphur contents varied from 1 to 7.36, and the ash was as high as 23.44. Notwithstanding these high percentages, satisfactory results were obtained. In fact, coal carrying a much higher percentage of ash and sulphur could have been used, providing the coal was not so fine as to pack in the producer. Lump coal gave no better results than fine, while under a steam boiler the size of the coal was of much importance.

The table shows the results obtained by the producer and steam plant, the first block in the diagram being the standard representing one electrical horse power per hour. The block in the left-hand column shows the frac-

tion of an electrical horse-power that was produced by one pound of coal as fired under the boiler. The second columns represents the fraction of an electrical horse-power per hour, generated by one pound of coal as fired in the producer; while the relative efficiency of the coal used in the producer plant, as compared with that used under the boiler, is shown by the size of the blocks and the ratio in the central column.

It will be seen that by each test one pound of coal used in the producer developed more power than the same coal fired under a steam boiler, and in some cases more than three times as much, the ratio running from .96 to 3.34.

Another striking feature of the test is the result obtained from peat fuel. More power was generated in the producer with peat than from the best Virginia coal used under a boiler. The peat gave values of .299, .308, .355, .388, .330; while by the best coal only .287 of an electrical horse-power was obtained under the boiler.

The report admits that, had the steam been compounded and condensed, much better results would have been obtained. But improvements could have been made in the producer plant. As the tests were made with a producer using forced draft, the tar was not consumed, but saved as a by-product. It must thus be seen that this style of producer was not the best for soft coal, as one consuming the tar would generate a larger volume of gas, and would recover as a by-product a large percentage of sulphate of ammonia.

A test at St. Louis of Ohio coal demonstrated that this coal, when gasified and burned in an internal combustion engine, producer 286 times as much energy as when the same coal was consumed under a boiler.

An average of fourteen separate tests made from thirteen different grades of coal shows that to generate one electrical horse-power by gasified fuel and internal combustion required 1.70 pound of dry coal per hour, while to create the same energy by external combustion, it required 4.29 pounds per hour; showing an actual waste, by the use of steam, of 2.59 pounds of coal per hour electrical horse-power. These results are remarkable when we consider the quality of coal used.

During the same year the coal mines in the State of Ohio produced 6,597,600 tons of coal. Of this amount 4.880.740 tons were used for power purposes, and excepting the efficiency of gasified fuel and internal combustion over external combustion to be but 50 per cent., the saving by the former method would equal 2,449,370 tons. This, at $1.60 per ton at the mine, would mean an annual saving to the State of Ohio of $3,904,592. How strongly this result reminds me of the situation in Nova Scotia!

At a test made of the Mond gas producer plant at Heyshan, using one producer and running two engines at full load, the I.H.P. was 509, the B.H.P. 432, and the full consumption 2,213 pounds; equal to 1.09 pounds per I.H.P. per hour and 1.28 pounds per B.H.P. The fuel used was small bituminous coal.

These tests are of much value, as their results, together with other valuable data that are being supplied from many different sections, point strongly to gasified fuel and the internal combustion engine as our future heat and power.

So near do the conditions in Ohio approach those existing in Nova Scotia that we are justified in accepting the economic results as final, and can apply the same line of determinations to our own situation. During the same year the mines of this province produced 5,800,000 tons of coal, which had an average value of $2 per ton at the mines, or a gross value of $11,600,000. To this sum an additional $2 per ton, or $11,600,000, should be added to cover costs of transportation, handling, commissions and middlemen's profits, making a grand total of $23,200,000, the sum actually paid by the consumer for 5,800,000 tons of coal. Of the 5,800,000 tons produced, 60 per cent., or 3,480,000 tons, were used for power purposes, the balance, 40 per cent., is represented by 2,320,000 tons consumed for domestic purposes. Of the 3,480,000 tons used for power purposes, about 9 per cent. of the actual thermal energy of the coal was utilized, while from the 2,320,000 tons of domestic coal the thermal heat utilized did not exceed 5 per cent.

If the amount of coal required for power had been converted into Mond gas and burned in an internal combustion engine (one having a combined efficiency of 20 per cent), 1,555,000 tons would have been sufficient to accomplish the same results as was secured from the 3,480,000 tons, while a large amount of economy would have resulted in our domestic requirements, as 1,150,000 tons would have been sufficient to accomplish the same results as we obtained from the burning of 2,230,000 tons, thus showing that by the use of gasified fuel, 2,705,000 tons of coal would have been sufficient to accomplish the same results as those secured from the 5,800,000 tons, our annual output. This would have resulted in a saving to the Province of Nova Scotia of 3,095,000 tons of coal, having a cash value at the mine of $6,190,000.

Continuing our economic policy, if we should add to our gasification plant one for the recovery of the sulphate of ammonia contained in the coal, the yield of which would have been about 80 pounds per ton, the total recovery at the present market price would have resulted in a net profit of $2,900,000. This sum deducted from our coal bill would leave a balance of $3,290,000, the net cost of our annual bill for heat, light and power, delivered in the gas holder at the mine and ready for delivery, as against $11,600,000, the present cost.

That we are approaching a period of economic transition, no one familiar with our national aspirations will question, and no subject should receive more serious consideration than the generation and distribution of the heat and power contained in our fuel deposits. The scientific investigator, capitalist and consumer are all beginning to recognize their individual responsibility. The latter expects the former to utilize a far larger percentage of the constituents combined in the raw material, and to do so on a scale of efficiency that will enable the finished product to be delivered at his door by the most direct means and at the lowest possible cost.

When these principles have been fully recognized and firmly established as a basis of our industrial life we shall apply them directly to our fuel deposits by establishing large central plants at collieries for the gasification of coal, and the recovery of the valuable by-products they contain. We shall construct transmission pipe lines to all points of large consumption. We shall further extend our economic principles by individual distribution of gas fuel for all domestic purposes, while by the adoption of gas engines we shall generate and distribute electricity for power and light. We shall then avoid paying tribute to transportation companies, teamsters, coal handlers, middlemen and the various other sources of expense we have now to contend with, all of which increase the cost of our fuel beyond its original cost of production; and above all, we shall escape paying a proportionate part of these various profits on

ashes and stone from which we now receive no benefit. We shall then receive a far larger equivalent in heat for the money expended. Power will be supplied in large units at prices that would defy the competition of Niagara. The smoke and dirt nuisance would be entirely eliminated, while our morning slumbers (for under such ideal conditions they would be peaceful and prolonged) would not be disturbed by harrowing dreams of neglected duty due the furnace, or the discordant cry of "coal, coal" by the hawker.

When the morning is bright with realizations of such ideal conditions, Halifax will be in a position to offer the manufacturing and industrial world advantages unequalled on the Atlantic seaboard, receiving as she will, heat, light and power from the mines of Pictou County at prices that will defy competition.

COLLAR AT No. 1 ALLAN SHAFT.

By H. E. Coll, Stellarton, N.S.

(Read before the Mining Society of Nova Scotia, 25th March, 1908.)

When sinking was commenced at No. 1 Allan Shaft in April, 1904, it was found that a considerable thickness of water-bearing sand, overtopped with clay, had to be penetrated before reaching rock. It was decided to use temporary timbering and continue sinking, leaving the permanent work to be put in when the sinking was finished. Consequently the first of June, 1906, we were ready to commence work on the following proposition:—

The original shaft opening, 12 feet by 24 feet, had been timbered with 10 inch by 10 inch hemlock, having 4 foot 10 inch centres, for a distance of 23 feet. At this point the walls had given way and the remaining distance of rock had been skin timbered and piled laterally. The shaft opening had twisted and was out of line, the south and east sides being closed in over 18 inches. On the surface the ground was broken back for a distance of 20 feet on the east side, the west side being fairly good. Two 14 inch by 30 inch timbers had been placed across the shaft, and the weight of the headframe rested on these. This headframe was 40 feet high and built heavy enough to hoist two tons weight.

The shaft was making an average of 30 gallons of water per minute, and this had to be handled daily, so that it was necessary to carry this headframe independent of the shaft timbering and collar work, and until the top section would be placed, the guides and shaft timber could not be moved. Commencing 300 feet from the south end of the shaft an incline was driven towards the shaft, so as to tap the shaft opening 20 feet below the surface. The material was handled by a horse and dump car, having a capacity of one cubic yard of material. This incline was cut from the surface and securely timbered. When the south end shaft timbering was reached, a turning sheet was put in and the material was taken out to that depth all around the shaft for a width of 5 feet 4 inches. This was done by benching, and as soon as sufficient space was gotten all around the shaft, a set of round sticks was placed, "log cabin fashion," the ends projecting 2 feet 6 inches, and drift bolts being driven at the corners and centres, on both sides and ends. As fast as space was made another set was entered from the bottom and packed into place. Braces were then placed on the corners and centres between the logs and the square shaft timbers. In this manner we reached the bottom of the incline, or 20 feet from the surface, but the ground on both east and west sides had broken and we were carrying the weight of the walls on our timber. The shaft timbers were then taken out, and as the 28 foot span was too much for our side logs to carry, we placed cross sticks on the shaft centre line, in such manner as not to interfere with permanent timbering coming up. The next 20 feet was a sandy mud that, if given an opening, would run like water. After two attempts we abandoned further sinking until we could get piles driven, as the surface had begun to break back a distance of 30 feet. In preparation for such an emergency, we had a pile driver and piles on the ground, and work was immediately commenced on the northeast corner by driving a pile between the projecting ends of the logs. Then a row was driven down the side around the south end and so on to the northeast corner again. The piles were yellow pine creosoted, 40 feet to 50 feet in length, and were pointed with steel shoes, made of one-quarter inch plate. All told, one hundred and twenty-four piles were driven around the shaft, and it was decided these should be sufficient to enable us to continue sinking. In order to take the weight of the "log cabin" timbering, we put in concrete "dead men" 50 feet back from the shaft corners and anchored the timbering by 1 inch wire rope. A tension of about eight tons was put on the four ropes. Before excavating below this timber 3 inch by 6 inch by 5 foot piles were driven at an angle of 10 degrees from the vertical, thus bringing the lower ends against the piles. We then took out sufficient muck to get in a set of timbers. In this way we secured ten more feet. But at this point we found that nearly half the piles that were driven had sheared and the upper end had then driven down inside the timber line. By this time the ground was broken on both east and west sides for a distance of 30 feet. As fast as the cracks opened up they were grouted full, but a rain at any time during these 24 hours would have probably caused serious trouble.

Fourteen inch round timbers were hastily swung into place, and braced across the shaft. These, of course, had to be kept clear of the No. 1 compartment, and the vibration of the headframe when water was being hoisted required them to be watched and tightened almost hourly. After placing ten braces we again began excavatin. We had to cut out the misplaced piles, drive plank piling and place the round timbers as closely following one another as possible, and in fact the different jobs overlapped each other. Most of this work was done below the surface of the muck, in order to prevent it draining out from behind the walls. The last nine sets of wall timbers had to be spliced, as the plates were too long to swing between the bracing, and this required centre bracing for each splice. These were placed in thirty-six hours, at the end of which time the shaft was squared up on rock at a depth of 52 feet. It was recognized that no time was to be lost, as the timbering was showing

grave signs of strain. The inch ropes were buried out of sight in the wood, and three of the cross braces were split. Fortunately everything and everybody was ready, and before all the muck was out of one corner the concrete was pouring into the other. As soon as a foot deep layer was on, three sets of yellow pine shaft timber were placed and braced at the corners and centres against the wall timbers. On top of this foot of concrete, and each succeeding foot, four 56 pound steel rails were placed one foot from the shaft plates and ends. These rails were 16 and 22 feet long, the shorter ones being placed at the ends and overlapping the longer ones. We found that the removing of cross braces, placing of shaft sets and rails gave sufficient time for the concrete to set.

The following means were used in handling the material:—

For hoisting water the main sinking engines were used, and when not utilized for water a muck bucket was hung and so used for mucking out for the timbering. The most of this, however, was done by the original sinking engines: a pair of 10 inch by 12 inch second motion Lidgerwoods. The rope led from the drum to the foot of a 30 foot derrick, which would swing one hundred and eighty degrees. A shakle and pin fastened to either a muck bucket or a hitch chain, depending on what was being handled. All the timber and rails were handled directly to place by this rope. The water was carried by troughs to inside the shaft line, until the stream would be overtopped by the concrete. At all times the concrete was kept thin enough to penetrate any crevices or open place behind the log cabin timbers, and "men" constantly rammed in to ensure compact setting.

The concrete for this work was of the following proportions:—

One barrel cement (350 pounds).
Three barrels sand.
Two barrels broken sandstone.
Two barrels slag.

This is equal to about one cubic yard of concrete rammed in place. The capacity of the mixer was five yards per hour, but owing to timbering, placing of rails, and other interruptions, the average was about half this amount. The crushed rock and slag were hauled and dumped on one side of the machine and the sand on the other. Each batch took a half barrel of cement, and all the material was loaded by hand and dumped into the mixer. From the machine it was conveyed by separate delivery chutes made of 10 inch galvanized tubes. One connecting piece was used as a switch to throw the concrete to any point desired.

The top section of the collar was widened out to include the foundations for the bankhead and headframe, as shown by the accompanying plan, and is, of course, counted in the cost of the shaft collar.

The weight of the various materials used in concreting are as follows:—

	Tons.
Cement	296
Stone	708
Slag	266
Sand	705
Steel	16
Total	1,991

The shaft sets required 36,400 feet of yellow pine, and in piling, staging and timbering 30,450 feet of spruce timber was made use of. One hundred and eight logs were used in the log cabin sets, and 124 piles were driven.

The cost of the completed shaft collar is as follows:—

Cost of labor—		
Excavating		$1,826.66
Piling		677.21
Concreting		1,929.80
Timbering		496.85
Total		$4,930.52
Cost of Stores—		
Piling		$1,225.63
Timbering		1,396.90
Rails		931.25
Sand		595.80
Rock		693.75
Cement		2,756.25
Total		$7,599.58
Total		$12,530.10
Cost per foot, depth of collar		$245.69
Cost per cubic yard of concrete—		
Labor	1.14	
Stores	2.39	
		$3.53

The work in the shaft was done by three eight-hour crews of eight men each, having two 12-hour foremen. The surface men worked two shifts of 10 hours each. Fourteen men were required in delivering and mixing the material for concrete. The work itself would not have been so difficult were it not for the several propositions which arose.

I will mention one trouble which caused us considerable anxiety: We had no ventilation in the shaft, and as a result a low barometer would bring the gas up the shaft in considerable quantities. All night work was done by electric reflectors, placed in the open air, and safety lamps were used in the bottom. The greatest precaution had to be taken to keep visitors from lighting matches or smoking in the vicinity of the shaft.

The hoisting of water was another matter that gave considerable trouble. A bucket holding 200 gallons and having a wing valve in the bottom was used, and each time this was landed on the bull chain it shook the ground all around the shaft and kept the mud constantly moving. The water was carried away in a large trough, and try as we might we could not present a little leakage when a bucket was dumped.

Another time the rope broke just as a bucket of water reached the top and it dropped the 1,500 feet to the sump without touching a timber on the way down. We lost five hours fishing that bucket up.

When finished we had the satisfaction of knowing that a big job had been well done, for not a drop of water showed on the face of the shaft timbering, and to-day that collar is bearing the weight of a steel headframe 110 feet high without showing a sign of any strain.

Mr. J. E. McEvoy, who has resigned from the staff of the Crow's Nest Pass Coal Company, Fernie, B.C., was presented with a handsome travelling bag, fitted with a gold pendant set with pearls and diamonds, and Miss McEvoy a solid gold braclet. Presentations also were made to Mr. McEvoy by the directors of the company, by the Fernie Club and by the Kootenay Rifles.

A Partial Bibliography of Publications Referring to the Geology and and Mineral Resources of Alberta, British Columbia and the Yukon.*

By J. C. Gwillim, Kingston, Ont.

The following classification of literature dealing with the exploration, geology and mining of these regions, is not complete. It has been compiled chiefly from three relatively accessible sources, namely, from the reports of the Geological Survey of Canada, and the Provincial Bureau of Mines, and the Canadian Mining Institute transactions.

The inclusion of some purely geological reports of the more remote districts seemed advisable, as offering first aid to those who go into them with the purpose of mining.

The reports of the Geological Survey provide our chief source of information in respect to the economic geology of these areas; and it may be stated that Alberta, British Columbia, and the Yukon, have received a great service from the Canadian Geological Survey, from the days of Richardson and Dawson, to the present summer, when eight field parties were working in these provinces. The publications of the Geological Survey are, in most cases, free, and will be sent on application by the Library of the Department at Ottawa.

The Annual Reports of the Provincial Mineralogists contain much statistical information relating to production and progress, together with reports or summaries of the conditions in the respective mining divisions. There are also incorporated in these volumes special reports upon mineral or coal areas, by the Provincial Mineralogist, the Provincial Assayer, and others competent to investigate them. The British Columbia reports, and also various bulletins on, and maps of, the mining districts of the Province can be obtained free, or for a small sum, on application to the Provincial Bureau of Mines at Victoria.

The transactions of the Canadian Mining Institute appear to round out our field of information, by giving detailed studies of mines, mining geology and mining operations. This is a source of information which is likely to increase as the provinces develop. Volume V. is especially valuable in papers relating to operations in British Columbia. It would make this paper too cumbersome if one ventured into a description of the material within the titles cited. Attention, however, may be called to those having an asterisk, as affording much detail information concerning the area or areas to which they refer. The work of Dr. G. M. Dawson is always valuable, and his observations cover a large portion of the country here considered.

Concerning the selection of papers and authors in this compilation, I am largely indebted to the Geological Indices of D. B. Dowling and F. J. Nicholas, also to the index of "The Canadian Mining Journal," up to Volume VI. Any important omissions may be added. The list is lengthy, but it is a tolerably available one.

The abbreviations used, are:

G. S. D.—Geological Survey Department, Ottawa.
M. M.—Report of the Minister of Mines, Victoria.
C. M. I.—Journal of the Canadian Mining Institute, Montreal.

Western Alberta.

Cairnes, D. D.—Foothills south of the main line of the C. P. R. G. S. D. Summary, 19-5.

*Dawson, G. M.—Preliminary Report upon the Bow and Belly River region, with special reference to coal deposits. G. S. D. 1880-1-1, or No. 167 and Map No. 177.
Report upon the Rocky Mountains between the International Boundary and Lat. 51′ 30′. G. S. D. 1886.

Dowling, D. B.—Coal fields of the foothills from Old Man River to the Athabasca. G. S. D. Summaries 1903-04-05-06, and maps of Sheep Creek, Cascade and Costigan coal basins.
Stratigraphy of the Cascade Coal basin, Vol. VIII., C. M. I.

Henrett, C. M.—Bankhead Coal Mines, Vol. VIII., C. M. I.

Gwillim, J. C.—Notes on the life history of coal seams, Vol. VIII., C. M. I.

Leach, W. W.—The Blairmore-Frank coal fields, with map. G. S. D. Summary 1902.

*McEvoy, Jas.—The Yellowhead Pass Route, with map, from Edmonton to Tete Jaune Cache. G. S. D. Summary 1898, or No. 703 separate.

Stockett, Lewis, and Warden, B. R.—The Anthracite Breaker of the Pacific Coal Company, at Bankhead, with plans. Vol. IX., C. M. I.

Smith, F. B.—Coal Mining in the Northwest, and its probable future. Vol. V., C. M. I.

Tyrrell, J. B.—Northern Alberta, with map. G. S. D. 1886.

Whiteside, O. E. S.—Across the Pitch versus up the Pitch. Vols. II. and IV., C. M. I.

East Kootenay.

Blakemore, Wm.—Pioneer work in the Crow's Nest Areas. Vol. IV., C. M. I.
Future of the coal and coke supply of B.C. Vol. VI., C. M. I.
Iron deposits near Kitchener. Vol. V., C. M. I.
Bull River iron deposits. M. M. 1900.

Carlyle, W. A.—Report on E. Kootenay. M. M. 1896.

Corless, C. V.—The Coal Creek colliery of the Crow's Nest Coal Company. Vol. IV., C. M. I.
Notes on the geology and a few ore deposits of Southeastern B.C. Vol. V., C. M. I.

Daly, Dr. R. A.—Geology of the International Boundary. G. S. D. Summary 1904.

*Dawson, Dr. G. M.—Report and Map upon the Rocky Mountains. G. S. D. 1886.

Dowling, D. B.—Northern extension of Elk River coal fields. G. S. D. Summary 1905.

Leach, W. W.—Crow's Nest and Elk River coal fields. G. S. D. Summary, 1901.

McEvoy, Jams.—East Kootenay map sheet. G. S. D. Summary, 1899.

* Read before the Canadian Mining Institute, Ottawa Meeting, 1908.

Crow's Nest coal field and map. G. S. D. Summary 1900.
Notes on the special features of coal mining in the Crow's Nest Pass. Col. VII., C. M. I.
Robertson, W. F.—Reports on East Kootenay. M. M. 1898.
Reports, including observations of McEvoy, Selwyn and Leckie and Baker, M. M. 1901; Bulletin and map of Flathead oil fields.
Reports on Windermere and Fort Steel. M. M. 1903.
Report on the Fernie Coal Mines Explosion (separate), 1902.
Selwyn, A. R. C.—Oil fields of Southwestern Alberta and Southeastern B. C. G. S. D. Summary 1891.

West Kootenay.

Brock, R. W.—Reports on West Kootenay. G. S. D. Summaries 1898-99-1900.
Geological Map of West Kootenay. G. S. D. No. 792.
Report and sketch map on Lardeau district. G. S. D. Summary 1903-04.
Report (Preliminary) upon Rossland. G. S. D. No. 939.
Report upon Rossland. G. S. D. Summary 1906.
Poplar Creek and other Camps. Vol. VII., C. M. I.
West Kootenay ore bodies. Vol. 2, C. M. I.
West Kootenay Notes. Vol. 3, C. M. I.
Carlyle, W. A.—Bulletin No. 2, Trail Creek. M. M. 1896.
Bulletin No. 3, Slocan, Ainsworth and Nelson Mining divisions. M. M. 1896.
Campbell, C. M.—Mining in Rossland District. Vol. V., C. M. I.
Campbell-Johnston, R. C.—Dry ores of the Slocan. Vol. V., C. M. I.
Cole, L. Heber.—Mine Surveying as carried on at the Centre Star Mine, Rossland. Vol. VIII., C. M. I.
Dawson, G. M.—Report on West Kootenay with map No. 303. G. S. D. No. 294.
Fell, E. Nelson.—Notes to accompany sections of the Athabasca Mine. Vol. V., C. M. I.
Gold milling practice at the Athabasca Mine, Nelson. Vol. V., C. M. I.
Fowler, S. S.—Notes on the Ymir mine and its mill practice. Vol. III., C. M. I.
Coarse concentration in the Slocan district. Vol. VI., C. M. I.
Garde, A. C.—Notes on the B. C. zinc problem. Vol. VII., C. M. I.
Gwillim, J. C.—West Kootenay ore bodies. Vol. III., Fed. C. M. I.
*Ingalls, W. R.—Zinc Resources of B. C. Dept. of Mines, Ottawa.
Ingall, E. D.—Silver mines of the West Kootenay. Journal Mining Society of Nova Scotia, Vol. III.
Hardman, J. E.—Notes on some mining districts in B. C. Vol. II., C. M. I.
Hall, Oliver.—The Le Roi Mine. Vol. V., C. M. I.
Hedley, R. R.—The possibilities for smelting in B. C. Fed. C. M. I., Vol. III.
Kirby, E. B.—Ore deposits of Rossland. Vol. VII., C. M. I.
McConnell, R. G.—On West Kootenay in G. S. D. Summaries 1894-95-96-97.
McDonald, Bernard.—Hoisting and Haulage (description of Le Roi plant). Vol. V., C. M. I.
Mining possibilities of the Canadian Rockies. Vol. VI., C. M. I.
Mine signalling by compressed air. Vol. VI., C. M. I.
Mine timbering by square sett system at Rossland. Vol. VI., C. M. I.
Parlee, Norman W.—Rock drilling and blasting. Vol. VI., C. M. I.
Robertson, W. F.—Report on Nelson district. M. M. 1900.
Lardeau, Fish Creek, Poplar Creek, etc. M. M. 1903.
Ainsworth, Slocan, and Slocan City Division. M. M. 1904.
Thompson, Wm.—Comparison of costs of compressing air with steam and electricity at Rossland. Vol. VI., C. M. I.

(To be continued)

THE NEW PREMISES OF THE IRON AND STEEL INSTITUTE.

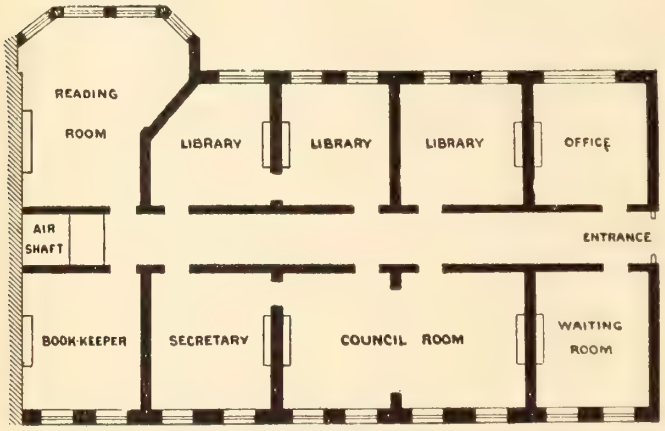
Owing to the steady growth of the membership of the Iron and Steel Institute, with the increasing clerical work thereby entailed, and to the expansion of the Institute library, which now contains several thousands of volumes, the Council decided, early in the current year, to secure more commodious offices, and to effect certain improvements in the internal arrangements with the object of providing additional facilities for the members. An opportunity fortunately presented itself for obtaining a lease of the spacious offices, in the same building, formerly occupied by Sir Douglas Fox & Partners. The acquisition of these premises presented numerous advantages, amongst which the fact that the address would remain unchanged, had much weight with the Council. Negotiations were therefore opened with the Westminster Trust, who are the landlords of the premises, and a satisfactory arrangement having been arrived at, the Council concluded an agreement at their meeting in February.

The new premises consist of a suite of ten rooms, on the first floor of No. 28 Victoria street, having precisely the same outlook as the recently vacated offices, and access being obtained from the same main entrance and staircase. The Council have also obtained the use of a storeroom, conveniently situated in the same building, on the sixth floor.

A plan of the new offices is shown in the figure herewith. The entrance is immediately opposite that of the old premises, and affords access to a spacious hall nearly 70 feet in length. The rooms have been decorated throughout in white enamel, with distempered walls of pale straw-yellow color, which ensures the maximum radiation of light, and enables an effective display to be made of the extensive collection of portraits and paintings possessed by the Institute.

To the left, on entering the hall, is a suite of five rooms overlooking Victoria street. The first room is fitted as a waiting room, and its most interesting feature is the large showcase containing the collection of early specimens of Bessemer steel presented to the Institute by Sir Henry Bessemer. Amongst other objects of interest on view in this case are short pieces of a 100 pounder gun tube made of Bessemer steel, a 74 pounder steel projectile formed in a hydraulic rolling mill of novel construction, designed and worked by Sir Henry Bessemer, part of a Bessemer steel rail rolled

at the works of the London & Northwestern Railway Company, and a portion of a steel rail twisted into a complete spiral, from end to end, without producing fracture. Two interesting specimens are pieces cut from the two first rails of Bessemer metal ever rolled, the metal having been made from Blaenavon grey foundry pig at Sir Henry Bessemer's experimental works at Baxter House, London, in 1856. A sample consisting of the earliest experimental example of metal converted by the Bessemer process is also shown, the resulting ingot having been rolled at the Royal Arsenal at Woolwich into a flat bar. This bar was made in about the month of June, 1856, and was among the samples of Bessemer metal exhibited at the meeting of the British Association at Cheltenham on the 13th August, 1856. With the exception of this bar, all the other samples shown on that occasion have been lost. There is also a small model gun forged from one of the first Bessemer ingots which were made at the works of Messrs. Bessemer & Company at Sheffield. An analysis of the metal of which this gun is made was conducted by Mr. Edward Riley, when it was found that it yielded 99,787 per cent. of pure iron, and was therefore equal in qaulity to some of the highest brands of Swedish bar iron. Another showcase contains a collection of medals and of the badges which have been issued at the various meetings of the Institute.



Plan of the new Iron and Steel Institute.

Suspended around the walls of the waiting room are portraits of Henry Cort (the inventor of puddling and of grooved rolls), George Thomas Clark (one of the trustees of the Institute, 1880-1898), Alexander Thielen (vice-president 1896), and Benjamin Walker (member of Council, 1889-1890), together with diplomas gained by the Institute at various exhibitions in which it has participated, including those of Paris, St. Louis and Milan.

The two adjoining rooms have been thrown into one, and form a spacious Council room. In a prominent position of this room stands a life-sized painting in oils, by H. T. Wells, R.A., of the seventh Duke of Devonshire, the first president of the Institute. At one end of the room is suspended a large oil painting, by Rudolph Lehmann, of Sir Henry Bessemer (president, 1872), at the period of his invention of the Bessemer process. At the other end hangs the portrait, in oils, of Edward Williams(president, 1879-81), presented to the Institute by William Jenkins of Consett. The Council room also contains the portraits of the past-presidents of the Iron and Steel Institute, viz.: Sir Lowthian Bell, Bart. (1873-75); William Menelaus (1875-77); Sir C. William Siemens (1877-79); Edward Williams (1879-81); Josiah Timmis Smith (1881-83); Sir Bernhard Samuelson, Bart. (1883-85); John Percy (1887-89); Lord Airedale of Gledhow (1889-91); Sir Frederick Augustus Abel, Bart. (1891-93); Edward Windsor Richards (1893-95); Sir David Dale, Bart. (1895-97); Edward Pritchard Martin (1897-99); Sir William Chandler Roberts-Austen (1899-1901); William Whitwell (1901-1903); Andrew Carnegie (1903-1905); Robert Abbott Hadfield (1905-1907). The Council room also contains a portrait of Mr. W. H. Bleckly, hon. treasurer, and albums containing a collection of photographs of members of the Institute.

A door of communication from the Council room affords access to the secretary's room, while the last room on this side of the hall is used as an office for the Institute's accounts and correspondence. On the western side of the hall is a large reading room and lounge, in which members may consult current periodicals, conduct correspondence, and meet each other for conversation or consultation. Smoking is allowed, and comfortable lounge seats have been provided, the Council being desirous of encouraging members to use the room as a meeting place. On the walls of the reading room are displayed portraits of the Bessemer medalists of the Institute, including Robert Forester Mushet, Peter Ritter von Tunner, Peter Cooper, Sir Joseph Whitworth, Bart., Alexander Lyman Holley, George James Snelus, Sidney Gilchrist Thomas, Richard Akerman, James Akerman, James Riley, John Devonshire Ellis, Henri Schneider, William Daniel Allen, Hon. Abram S. Hewitt, Lord Armstrong, C.B., Arthur Cooper, John Fritz, John Gjers, Henry Marion Howe, Hermann Wedding, Richard Price-Williams, Henri de Wendel, John Edward Stead, Friedrich Alfred Krupp, John Oliver Arnold, Floris Osmond, Johan August Brinell.

In this room also stands a handsome marble pedestal, surmounted by a marble bust of F. Krupp (hon. member of the Institute), bequeathed by Mr. Alfred Longsden, and a bust of the late Sidney Gilchrist Thomas. Over the mantelpiece is a small bust in cast iron of Professor A. Ledebur (hon. member of the Institute).

The three adjoining rooms on this side are devoted to the library of the Institute. In the last of the three provision is made for special research for the purpose of enabling members desirous of consulting works of reference, or the files of mining and metallurgical periodicals, to do so in quietness and privacy. In this room a card catalogue to the library is available, and the current files of some hundred and fifty technical journals are placed in boxes easy of access.

The last room of this suite (the first on the right, on entering) is the general office for inquiries, etc. In the new premises effective ventilating apparatus is provided, and the hall and rooms are lighted by Osram electric lights. There is telephonic communication between the various rooms. In case of fire there is an iron door to shut off the premises from the rest of the building, and fire-extinction apparatus is provided.

It will be seen from the foregoing that the new premises are considerably larger than those just vacated, and it is hoped that not only will the increased facilities thus provided attract the London members of the Institute who may have occasion to avail themselves of them, but that the members resident in the country and abroad may find them increasingly useful when they visit the metropolis, and thus realize the objects which the Council have had in view in planning and carrying out the necessary alterations.

EXCHANGES.

Mines and Minerals, April 1908.—Cyaniding Cripple Creek ores is the subject of a paper by F. L. Barker in this number of Mines and Minerals for April.

The rates for ore treatment offered by the Golden Cycle Mining Company in their independent custom mill aer as follows:

Golden Cycle Rates.	Per ton.
Up to $8 inclusive	$4.00
$8 to $10	4.50
$10 to $15	5.25
$15 to $20	6.00
$10 to $25	6.50
$25 to $30	7.00
$30 to $40	7.50
$40 to $60	9.00
$60 to $100	9.00
$100 to $150	12.00
$150 to $200	13.00
$200 to $300	13.50
Over $300	13.50*

*Plus 1 per cent. assay value.

The competitive rates of the United States Reduction and Refining Company have been made slightly lower than these. The result of this rivalry has been highly beneficial to the camp.

The costs of mining, including stoping, developing and sorting are nowhere less than $8 per ton, and in many cases are higher. Millions of tons of low grade ore are slowly becoming available, as heretofore no ore running less than $20 has been shipped. Cyanidation is believed to be the key to the problem.

An analysis of the Golden Cycle ore may be quoted here:

Silica, per cent.	55.98
Alumina, per cent.	17.09
Iron, per cent.	3.44
Magnesia, per cent.	0.47
Lime, per cent.	0.71
Sulphur, per cent.	1.77
Gold per ton, oz.	0.98
Silver per ton, oz.	0.62

The principal primary miners are calaverite, tetrahedrite, sylvanite, barite, quartz, pyrite, fluorite, calcite, dolomite. The secondary minerals are gold, gypsum, psilomelane, limonite, alunite, and epsomite.

These secondary minerals occur in the oxidized zone and are amenable to cyanidation. But the ores containing the tellurides of gold and silver have to undergo preliminary treatment, since compounds of tellurium are not soluble in cyanide solutions. Roasting is resorted to for this. Bromo-cyanide has not met with much success.

The Isabella cyanide mill, working low grade dump ore, gives a four-day leach. The tank capacity is to be increased so as to permit of a six-day leach. A 9 inch by 15 inch Blake crusher, fed by gravity, takes the ore from the bin. At the crusher, lime is added at a rate of about 5 pounds to the ton of ore. The ore then goes to a 16 inch by 36 inch Davis roll and thence to two 14 inch by 27 inch Davis rolls. It is then passed over a ¼ inch mesh bumper screen, the oversize from which is returned to the last set of rolls, the undersize going by a belt-conveyor to a storage bin of 200 tons capacity. Six leaching tanks, 5 feet deep, 30 feet diameter, holding 125 tons and arranged in a single row are filled in 4 hours. The four end tanks are filled by the belt conveyor, the two middle tanks direct from the storage bin, which is placed just above them.

Strong solution, 4 pounds of cyanide to the ton of water, is added first, followed by a 3 pound, and then a 2 pound solution, and finally by a wash of water. As the solutions are drawn off they pass pass though a battery of nine zinc boxes to a sump below. The leached sands are shovelled through manholes in the tank bottom on to a belt conveyor and thrown on the tailings dump. Two men empty one tank in 8 hours. Water is scarce and this method is unavoidable.

The gold-zinc slimes are washed and the wash water is passed through a filter consisting of a 7 foot wooden tank with perforated bottom, over which is placed first burlap, then a cheap cotton blanket, and last a muslin bag. They are then dipped out of the boxes and thrown into a lead-lined tank, and, as they are being put in, full-strength sulphuric acid is added slowly. When all the slimes are in, the portion caught in the filter is added and the whole is diluted by one-fourth its bulk of water. Live steam is turned in and the contents are boiled until solution of the zinc is complete. This takes from 8 to 10 hours. The tank is now filled with water, allowed to settle and the solution is decated on the same filter as before used. The dried muslin bag is then placed on top of the gold precipitate and burned. The gold is drawn off from the bottom of the tank and dried. Equal parts of gold and flux are mixed in a No. 80 crucible and melted. The flux is:

	Parts by weight.
Borax	10
Bicarb. of soda	10
Potassium nitrate	¼
Silica	3

From this melt a matte and gold button result. The gold button is put in a crucible with a charge of potassim nitrate and a soft iron rod and given a second melt. A pure bar results.

The average costs of treatment of ore per ton are:

Tramming ore to mill	$0.22
Disposal of tailings	0.09
Repairs	0.02
Milling	0.14
Cyaniding	0.38
Acid treatment, fluxing and melting	0.02
Total	$0.87

Tailings run 67 to 80 cents. Therefore ore running over $1.67 can be treated.

The Iron and Coal Trades Review, April 17th, 1908—The evolution of the coal mine explosion is traced by Mr. E. J. Deason in the Iron and Coal Trades Review. After much experimenting Nobel, in 1867, found that he could control nitro-glycerine by blending it with Kieselguhr. Dynamite, or Nobel's Safety Powder, was patented on May 7th, 1867. Nobel had previously patented the detonator in July, 1864.

For some years the formula, 75 per cent. nitro-glycerine and 25 per cent. Kieselguhr, was used. This af-

terwards was known as "Dynamite No. 1." "Dynamite No. 2" was made to meet the demand for an explosive for use on coal and rocks of varying hardness. It proportions were: 18 per cent. nitro-glycerine, 71 per cent. nitrate of potash, 10 per cent. charcoal and 1 per cent. paraffin. In 1875 Nobel made the advance of including gun cotton in the list of ingredients. Other nitro-glycerine explosives were brought out by Nobel. But meanwhile, although Nobel monopolized the manufacture of this class of explosives, much attention was being paid by other investigators to the "Nitrate Class" of compounds, which class now includes the greater proportion of the powders used for coal getting.

The Explosives Act of 1875 did much to reduce accidents in the use and manufacture of explosives. But at the commencement of the last decade of the nineteenth century it became increasingly evident that further legislation was needed as regards the use of explosives in coal mines.

A new Act in 1896 brought into existence a "Permitted List." Explosives to be used in coal mines had to pass certain tests at Woolwich. The effect of the constant addition of stringent revised tests to the Act has been the elimination of all powders carrying high percentages of nitro-glycerine. The list is practically made up of the ammonium nitrate class.

Eight explosives, whose composition is given below, make up 77 per cent. of the total explosives used.

Bellite—Per cent. of total explosives used, 4.7; itrate of ammonium, 87; other constituents, per cent., 16 D. N. benzol.

Monobel—Percent. of total explosives used, 4.9; nitrate of ammonium, 80; other constituents, per cent., 10 guncotton, 10 woodmeal.

Westfalite—Per cent. of total explosives used, 5.7; nitrate of ammonium, 93; other constituents, per cent., 6 resin.

Roburite—Per cent. of total explosives used, 8.3; nitrate of ammonium, 88; other constituents, per cent., 11 D. N. benzol.

Ammonite—Per cent. of total explosives used, 8.8; nitrate of ammonum, 88; other constituents, per cent., 12 D. N.naphthaline.

Carbonite—Per cent. of total explosives used, 12.4; nitrate of potassium, 33; nitro-glycerine, 26; other constituents, per cent, 40 woodmeal.

Saxonite—Per cent. of total explosives used, 14.6; nitrate of potassium, 22; nitro-glycerine, 52; other constituents, per cent., 18 ammonium oxalate.

Bobbinite—Per cent. of total explosives used, 17.6; nitrate of potassium, 64; other contituents, per cent., 19 charcoal, 15 saltpetre.

It may thus be seen that modern practice in coal-getting is reverting to the old sulphur, charcoal and saltpetre compound. Probably, however, the safest and best method of winning coal will prove to be by the use of mechanical means.

Mining and Scientific Press, April 18th, 1908.—Mining costs in the Joplin district are written of by Doss Brittain. The low prices of spelter have reacted upon mining in this dictriet and costs are being carefully overhauled.

Royalty, in all cases calculated on the gross sale of ore, ranges from 7 to 30 per cent. If the operator is fee-owner there is no royalty.

Workmen are paid as follows:

Engineer	$2.25 to $4.25
Fireman	3.00
Hoistman	$2.50 to 2.75
Machine men	2.75
Helpers	2.25
Shovellers	$3.00 to 3.50
Powder men	3.25 to 3.50
Jig man	4.00 to 5.00
Blacksmith	2.50 to 2.75
Boss (day)	5.00
Boss (night)	3.00

The superintendent is usually paid $150 per month.

Steam, gas, and electricity are the forms of power used. The cost of one horse-power hour using steam is 1.75 cets, running non-condensing. Steam power with gas, non-condensing, costs about 0.75 cent per horse-power hour, while with gas condensing the cost is reduced to 0.5 cent. Gas power runs as cheap as 0.25 cent. Electricity costs 1.25 cents per horse-power hour.

The cost of explosives per ton of material broken should not exceed 10 to 12 cents.

Mills are insured at a rate of $2.50 to $5 per $100 valuation.

The actual cost of placing a ton of zinc concentrate in the bin is variously estimated from 50 cents to $1.50, the latter including all necessary expenses involved in a year's work, pumping, exploring, timbering, construction work, and general expense.

The operation of mining crude ore includes:

Breaking ground	$0.41
Shoveling	0.21
Hoisting	0.14
Pumping	0.10
Exploring	0.10
Timbering	0.01
Total cost of mining	$0.97
Milling	0.25
General expense	0.25
Construction	0.14.
	$1.48

Mines and Mining, April 17th, 1908.—In an editorial on the market value of copper, Mines and Mining reaches the conclusion "that in the next couple of years the selling price of copper will be from twelve to fourteen cents, and that any increase will be but temporary, due to universal causes. This is a condition we cannot avoid, since nearly all of our large producers can mine, smelt, and refine the metal at a cost of ten cents, or less, and in many cases the gold and silver contents more than pay all charges."

The Mining World, April 18th, 1908.—In this number Ralph Stokes' article on "Record Shaft Sinking on the Rand Gold Field" will appeal to the managers of metalliferous mines in Canada. Mr. Stokes speaks in high praise of "the time-honored combination of white supervision and Kaffir muscle."

Deep shaft sinking in the Rand has few drawbacks. Water troubles are almost nil and at a depth of more than 3,000 feet a full 8 hour shift can be performed without the aid of artificial ventilation, so slight is the increase of temperature with depth.

PERSONAL AND GENERAL.

Dr. A. M. Campbell, of Ottawa, was in Toronto recently.

Mr. Leon C. Jones has retired from the management of the Canada West mine, near Taber, Alberta.

Mr. J. R. Cowans, general manager of the Cumberland Coal & Railway Company, has returned to Springhill, N. S., after a visit to Quebec and Ontario.

Mr. W. J. Prisk, late of the Dominion Antimony Company, West Gore, N.S., is directing the development work of the Eagle Mining Company's property at Renfrew, N.S.

Mr. J. Dix Fraser, late works manager of the Dominion Iron & Steel Company, Sydney, N.S., has accepted the position of general manager of the Atikokan Iron Company, Port Arthur, Ont.

Mr. F. N. Flynn, for the past year manager of La Rose, Lawson, University and other mines of the Timmons-McMartin corporation at Cobalt, has resigned and will shortly return to the States.

Mr. H. Mortimer-Lamb, secretary of the Canadian Mining Institute, met the Toronto members of the Council at the King Edward Hotel on May 6th. Plans for the reception of British delegates next summer were discussed.

On April 22nd Mr. A. J. McNab, metallurgist of the Consolidated Mining & Smelting Company, Trail, B.C., was united in marriage to Miss A. Bingay at Yarmouth, N.S. Mr. and Mrs. McNab are expected to return to Trail before the end of May.

The Senate of Queen's University at the annual convocation held in Kingston, Ont., on April 29th, conferred upon Mr. Milton L. Hersey, of Montreal, the honorary degree of L.L.D. In the Senate's letter of notification the reason for granting this honor is given as being "in consideration of your position as the leading man in Canada in your chosen profession of consulting chemist and chemical engineer." Dr. Hersey, whose career was outlined in these columns recently, is now chairman-elect of the Canadian Section of the Society of Chemical Industry.

One of the first official acts of the Earl of Crewe, the newly-appointed Secretary of State for the Colonies, was to cable to Mr. Herbert C. Burchell, of Sydney, N.S., offering him the important position of Director of Public Works for Jamaica and a seat on the Executive Council there. Mr. Burchell is the vice-president and managing director of the Sydney Cement Company. He is a graduate of McGill University of long standing. He was formerly Government Engineer in New Foundland, and has made valuable reports to the Colonial Office on the resources of British Honduras. It is not often that the authorities go outside the ranks of the permanent services to find men for official positions in the Crown colonies. The offer indicates a high appreciation of Mr. Burchell's standing as a Canadian civil engineer.

LAND MADE GOOD BY ITS PEAT.

In the work of reclaiming the 25,000 acres in the great peat bogs of Konigsmoor and Marcardsmoor in the Leer District, East Friesland, the land will be drained by a network of 25 miles of canals, and a station for generating electricity will be established at the junction of the main canal with the high road from Leer to Wittmund. Current from this station will be distributed over an area 30 miles in diameter. The peat will serve as fuel, the plows and other machinery used in fitting the land for cultivation being driven by power from the bog products, which will also give light and power to many surrounding towns.

OUTLINE OF PROPOSED SUMMER EXCURSION OF THE CANADIAN MINING INSTITUTE.

The outline given below is provisional. It is subject to modification in all its details. The date of the arrival of British delegates at Quebec is, however, understood to be fixed as August 24th. The itinerary is as follows:

Stage I.—Nova Scotia and Quebec Excursion—Quebec to Sydney, including, in Nova Scotia, visits to the Pictou and Glace Bay coal mines, to the Dominion Iron and Steel Works, and the Nova Scotia Steel and Coal plant. In Quebec, the asbestos and copper regions of the Eastern Townships will be visited, Quebec to Montreal. Time required, approximately 9 days. Approximate cost, $150.

Stage II.—Ontario Excursion—Montreal to Toronto. Niagara Falls, Cobalt and Sudbury will be visited, probably also the Atikokan Iron Company's Works at Port Arthur. Time, 6 days. Cost, $100.

Stage III.—Western Excursion—North Bay to Victoria, B.C., and return, including visits to the Fernie and Bankhead coal mines, the St. Eugene silver-lead mines at Moyie, the copper-gold mines and metallurgical works of Rossland and Boundary, the Bonnington Falls power plant, etc., etc. Time required, 25 days. Approximate cost, $250.

It is roughly estimated that the cost of the whole excursion will not exceed $500, and it is hoped that these costs may be somewhat reduced if arrangements, now being negotiated, are satisfactory completed.

CORRESPONDENCE.

To the Editor,

"The Canadian Mining Journal."

Dear Sir,

In your last issue the reviewer of Mr. Low's "Technical Methods of Ore Analysis" makes an error in crediting me alone with the design of the new form of electrolytic apparatus referred to. This apparatus was designed by Mr. George A. Guess and myself after much joint experimenting.

In connection with this I would like to draw attention to the difference between Guess' method and the ordinary electrolytic method for copper. According to Low the preparation of the solution by the ordinary method calls for at least 15 separate time and attention requiring operations such as heating, filtering, and washing, and 13 addditions of reagents. Guess' method, which, by the way, is entirely independent of the style of apparatus used, calls only for boiling with nitric acid, the addition of the special nitro compound and dilution with water. The subsequent electrolysis requires a much shorter time, as stronger current densities are used. The results are as accurate as by the older method.

Guess' work in the electrolytic assaying of copper and of lead is the most important contribution to the art of assaying since the introduction of gasolene furnaces.

Yours faithfully,

H. E. T. HAULTAIN.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The Sydney Daily Post is offering a weekly insult to the intelligence of its readers in the shape of letters signed "Shotlighter," the object of which appears to be to discredit the present Grand Officers of the P. W. A., presumably for political motives, and to herald the golden and Saturnian age of U. M. W. A. reign, as now exemplified in the States. This gentleman begins one of his mendacious epistles as follows: "When there is lack of matter for argument it is always safe to appeal to prejudice" and thereupon proceeds to make a dreadful example of himself by writing in a strain that we venture to assert is redolent with the savour of prejudice added to an evident and abyssmal ignorance of mining that at once suggests a nigger in the woodpile.

We have nothing to do with P. W. A. or U. M. W. A., and we leave the internal arrangements of trades unionism in Cape Breton to those whom it concerns, but we do object to an attempt to upset the pleasant relations that now exist between the Dominion Coal Company and their men, and to the utterly useless and inflammatory letters which the Post is now publishing, much to its own detriment and discredit among the mining towns.

A few quotations may serve to justify our language and to show the unprejudiced wisdom of our Glace Bay Solon. Referring to the late three years' contract, he writes: "The safety lamp was introduced without any rise in wages, although by using it the miners' earning power is lessened by 'fully ten per cent.'" The single quotes are ours. This statesment needs no analysis, and it has not even the garment of plausibility to cover its indecent nakedness. If "Shotlighter" had ever seen the last sad journay of the victims of a mine explosion he would not use such mischievous and dangerous arguments. Maybe, seeing that he so loves the ways of U. M. W. A., he could view with equanimity the sight of such processions as have recently wended their doleful course in that favored land where the U. M. W. A. has its main stamping ground. The man who will appeal to the ignorant prejudice of the few and attempt to inflame the minds of men against so necessary a precaution as safety lamps is incontinently condemned out of his own mouth, and no further utterances of his are worth our attention.

However, the average man has so pathetic a faith in the truth of the printed page that we think it is necessary to point out a few more of the unbiased statement of this ingenious prevaricator.

He states that the U. M. W. A. have already secured an equitable Compensation Act and an eight hours day for miners in Western Canada "whose wages are 100 per cent. higher than ours." If this is so there are exceedingly fortunate men in Western Canada, but we saw a letter the other day from Fernie, B.C., stating that soup kitchens had been opened there to relieve the distress, and the writer (a Cape Bretonian) said he wished he were back where Canadians manage their own business, namely, in his own country. It is a little naive to say that the U. M. W. A. had obtained the two legislative measures above referred to. We presume they were passed by a Canadian legislature, and we are under the impression that they are measures not of American origin, and we have never heard that the U.M.W.A. ever obtained such measures in their own land. We admire the gall of the man who will try to tell us that we can learn anything in the way of legislation relating to mining from the United States or any labor organization from that country. We will undertake to say that we have good mining legislation in Nova Scotia, and it is enforced also, which is more than can be said of the district controlled by the U. M. W. A. politics.

"Shotlighter" states that "wages earned are from various causes falling." We admit it, everywhere but in Cape Breton. We may say that the pay roll of the Dominion Coal Company in March was the largest in its history, and further that the average wage earned per man employed was the highest on record also.

The Post writer criticises some remarks of "Rambler" in the Mining Record, and refers to this well-known person as a "wiseacre." Incidentally it occurs to us that "Rambler" has in all probability forgotten more about mining matters than "Shotlighter" ever knew, although we apologize to the former for the comparison. To quote: "According to this wiseacre we would simply be put out of business, while cheap American coals would flood Canadian markets," and other like absurdities. This reads more like an appeal to prejudice than an argument, and no attempt is made to disprove the statement referred to. Suppose P. W. A. passed, and U. M. W. A. became the order of the day, and it were thought well in the interests of 400,000 miners in the States that they should have a larger share in Canadian coal markets, would they then be so solicitous for Cape Breton? This reminds us that a writer from Springhill in criticizing some former remarks of ours in this column fell foul of the opinion expressed that Canadian should keep themselves free from the imbroglio of U. M. W. A. politics, that "wonderful game," as it is described by the Coal Trade Journal. He asked why international and artificial boundaries should be allowed to stand between the brotherhood of man, and why such boundaries were ignored in religious matters, finishing by the remark that we were living out of harmony with the designs of our Creator. This may be, but the cold and naked truth is that Canadians can not afford sentiment when dealing with the United States in matters of business. Here we are a lone seven million against seventy million on the other side of the line. Despite the Free Coal League and the altruistic balderdash that is talked by some pre fervid trades unionists, anything approaching reciprocity either in trade or in organizations must be impossible between two such unequal forces. If Canada is going to play a lone hand let her play it. And may we be preserved from the Pinkerton van, the picric acid bomb, the Gatling and the revolver, the illegal trial and the red flag of anarchy that are amongst the choice flowers of American trades unionism. We can dispense with these little amenities in Cape Breton.

Perhaps we have labored this matter too much, and have made a molehill out of a mountain. At any rate there is a very well defined feeling down here that there is no real enthusiasm behind this amalgamation talk, and that the efforts of the Post and its henchmen are directed against the personal prestige of the present leaders of the P. W. A.

To return to "Shotlighter"—he states that the workmen of the Dominion Coal Company, in accepting the recent award of the Board of Conciliation, have been "hoodwinked," that the advances given are "mythical" and that the men have been the "dupe" of their employers. We take it this is a serious reflection on the members of the recent board. Dr. Kendall and Prof. Shortt satisfied themselves that the award given meant a net gain the men of about $70,000 per annum. Did our Münchhausen ever read of the person who threw mud at the "shining one" in the Pilgrim's Progress? It would be just as well if he mixed a little truth with his statement, but we notice that whenever by chance there is a modicum of truth in "Shotlighter's" letters it is that half truth which is "ever the worst of lies."

We hope we have shown the mischievous unreliability of the correspondent of the Post and we again wish to deprecate the attempt made by a local newspaper to upset the industrial peace that means so much for Cape Breton industries, everyone of which is dependent on the coal mines. Everybody, merchants, workmen and operators, have taken fresh courage from the way in which the recent Conciliation Board arranged matters and promised unrestricted development for at least two years, and if the Post sees fit for the sake of pandering to the restless element and the sensational appetite that exists in all communities to act the part of the gratuitous firebrand, so much the worse for the Post. When they employ a "Shotlighter" they should take care that his squib is not damp. We naturally conclude that he would use a squib. We don't suppose he ever heard of a detonator.

Although at the beginning of the month conditions promised well for an early opening of St. Lawrence navigation, the ice was very heavy for the last three weeks of April, and the Dominion Coal Company's steamer fleet were tied up in the St. Lawrence for quite a time. At the time of writing, however, the ice has largely passed to the southward, and shipping will begin in earnest the first week of May. The output of the mines during April was approximately 300,000 tons. The reduction in output compared with the previous month was due to idleness of the mines enforced by lack of shipping due to ice conditions. Lifting from bank will probably commence early in May, and for some months to come the Sydney and Louisburg will have all it can handle in the way of coal.

The Hub Colliery was idle during most of the month of April for the purpose of installing a modern electrical endless haulage system, which has necessitated the straightening and widening of the Main Deep. The new man hoisting engine is completed and running. The whole mine has been cleaned up and repaired after the fire and flooding, and is now in better shape than ever before. It will be working in full operation again by the end of the first week in May.

The work on the No. 12 Branch is being pushed vigorously, and a large number of men are employed on the line. The work of building dwellings is also proceedings, and there is a quite respectable bank of coal waiting for the railway.

NEW BRUNSWICK.

St. John.

From a gold strike made on a branch of the Restigouche, interested parties believe that the future gives promise of great mineral development in that country. Early last fall a number of Campbellton gentlemen became interested in the matter, and claims were staked out and preliminary work done.

For several years the question as to the possibility of gold, copper and other minerals being embedded in the rocky hills on the banks of the Restigouche has been a subject of comment. There were many stories of the finding of gold by early settlers, but nobody seemed certain as to the locality of the find. It was a recent discovery, however, that resulted in the formation of a company several months ago.

On Friday, the 17th ult., Messrs. William S. Montgomery, Dalhousie, W. A. Mott, Maxwell M. Mowatt and George G. McKenzie, members of the company, left for Charlo and from there drove to the property, which is situated on the Upsalquitch, and inspected the mine, which was being worked by a small force with a view to learning the exact extent of the vein of ore. The party returned from their trip on the following Monday, all well satisfied with the results so far obtained. The hill was being tunnelled and the ore taken out was improving considerably at every shot. It was also reported by members of the party that work was well under way on the shaft.

The company have secured rights over some five miles of country, and it is expected that "pay dirt" will be found in sufficient quantity to warrant the construction of a branch line from the mine to the Intercolonial Railway, some fifty miles distant.

It is said that several other companies have been formed and prospecting is in progress all over this section of the country. Some have been successful and further reports are looked for in the near future.

From Bathurst comes the report that T. M. Burns has received from Mr. Drummond a communication in which he speaks favorably of the Gloucester iron deposits.

In his letter, Mr. Drummond states that it is the intention of his company to open up the mines this summer.

The Provincial Government will be approached relative to certain concessions and rights to control the great water power of the Nepisguit River. Mr. Drummond adds that he considers the Gloucester iron deposits among the finest in the Dominion. It is Mr. Drummond's intention to visit Bathurst in the near future, when it will be learned just what the intention is with regard to smelting, etc.

A company was formed some three or four years ago, when a charter was obtained permitting the construction of a railroad from Bathurst to the Twin Tree mine, which received its name from a freak of nature in the form of two magnificent pine trees with but one top, and standing just behind the camp. Efforts are now being made to alter the charter in some respects, after which the company will proceed to carry out the plans for which it was organized.

ONTARIO.

"66." A correspondent, writing under date of April 18th, sends us some details concerning the new mining camp south of Lorrain. The camp is styled "66"—a name that has stuck. Its location is approximately 16 miles southeast of Cobalt, Ont., on the Ontario side of Lake Temiskaming, in the unsurveyed country south of Lorrain. The district was not thrown open to prospectors until late in 1906. The country is heavily timbered, the clay soil is deep, and there are few outcrops. Hence prospecting has been slow. In the latter part of the summer of 1907 discoveries, however, were made. The Keeley, Landon, Mayhow-Brough, Maiden, Forniri and other claims have excellent showings.

From the Keeley claim, 350 sacks of ore, reported to average 3,000 ounces of silver per ton, were taken out along the vein by three men since December, 1907. At a point six feet from the surface the vein is from 4 to 6 inches wide and is largely composed of wire silver. The Haileybury Silver Mining Company are sacking a high grade cobalt ore. Their main shaft is sunk to a depth of 40 feet on the vein. Very little development will put several other properties in a position to make small shipments of high grade ore. The veins in the Maiden and Forniri properties lies in the slate, cutting through the contact with the diabase.

The field explored for two miles south of the Keeley claims to the shores of Lake Temiskaming northeast, has shown native silver or cobalt in encouraging quantity.

The district is accessible by good trails and lumber roads. Lumber companies are still operating. Transportation by steamer on Lake Temiskaming is offered either from Mattawa or Haileybury Wharf and storage facilities are to be provided by the transportation companies, and the Ontario Government will extend aid in buildinga wagon road from the wharves to the mining sections.

Cobalt.

Southeast Coleman.—The discovery of a rich vein at 200 feet in the Temiskaming property, a feeder from the main vein, the increasing richness of the new vein on the Badger and the location by a diamond drill of a promising vein on the Shamrock, has resulted in increased activity in the development of properties in this section. On the Shamrock, which lies directly north of the Beaver and east of the Badger, diamond drilling was started some weks ago. The first drill hole was put down at an angle of 45 degrees to cut the contact of the Keewatin and diabase in the southern part of this lot. At 110 feet a number of small veins were encountered, and for 20 feet the ground was much broken and cut with narrow stringers. Small silver values were obtained from every core taken out. At 120 feet a 12 inch vein of calcite showing native silver and assaying 690 ounces was cut. The drill, which is now down 170 feet, will be sunk at least 100 feet more. A shaft will be started at once on the vein. The shaft on the new vein of the Badger is down 125 feet. Drifting has been started at 106 feet. The vein is 5 to 7 inches wide and carries silver. The development work in this section of the camp has demonstrated that a depth of 75 to 100 feet must be reached before high silver values are encountered. The Beaver No. 1 shaft, now down 85 feet, will be sunk 100 feet deeper. The vein, which is now practically solid smaltite and niccolite, carries small silver values. On both the Lumsden and Coleman Development properties, shafts will be sunk 100 feet and drifting and crosscutting done at this level. Negotiations are now under way to arrange for the resumption of work on the Rochester and the Davis properties.

Silver Queen.—The new 12 drill compressor and 100 horsepower boiler are now installed. It is announced that diamond drilling has proven values to a depth of 390 feet, and the No. 1 shaft will be sunk to a depth of 400 feet.

Chambers-Ferland.—Two shafts are being sunk here, and one is now down 16 feet and the other 32 feet. Contracts have been let for the sinking of both. Hoists will be put in at both shafts and machine drills used. Air for hoists and drills will be obtained from the Nipissing. No. 1 shaft has a vein of calcite and smaltite, and No. 2 a 4 inch vein that will run six thousand ounces.

Buffalo.—A very rich vein has been struck here. The ore is similar to that on the Crown Reserve.

Right of Way.—Cheques for the payment of a seven per cent. dividend have been sent out. In 15 months $105,000 has been paid in dividends, making a total of 21 per cent. The original price of the property was $50,000.

Silver Leaf.—From October 21, 1907, to April 8, 1908, the ore mined amounted to 312,144 pounds, worth $150,000.

City of Cobalt.—On May 5 a new vein was encountered 80 feet from the shaft at the 137 foot level. The vein is from 3 to 4 inches wide and as rich as any yet found on the property.

Thethewey.—In the week ending May 2 the Trethewey shipped three cars of ore, weighing 192,800 pounds. The total output since January 1 is 679,916 pounds, making this mine fifth in the list of shippers. Reports from the mine indicate that the property is in excellent shape.

Night Hawk Lake.

On Gold Island, in Night Hawk Lake, there is a three stamp mill in operation. The ore being run through is taken out by quarrying and is showing high values. The ice on the lake is still firm.

Montreal River District.

On Monday, May 11, the Ontario Navigation Company will begin the operation of a line of steamers from Latchford to Elk City. The gasolene boats will also start regular trips on this date. A large quantity of supplies and mine equipment which has been accumulating at Latchford, awaiting the opening of navigation, will be sent in as fast as the boats can handle the stuff. A number of engineers and representatives of Canadian, English and American capital are booked for the first boats.

ALBERTA.

Coleman.

Trade still continues dull all over the Province, but the Coleman mines of the International Coal and Coke Company are working almost full time. The coal trade in the Crow's Nest Pass depends to a great extent on railroad consumption, and owing to the decrease of traffic the demand for coal has been small. The past mild winter has also been against the coal trade.

It is claimed that about 2,000 men are idle around the various mines.

Edmonton.

A Winnipeg and St. Paul development company have secured an extensive coal area near the Pensluna river, north of this city. These holdings were taken up last fall and the prospecting work done shows the area to be valuable. No steps will be taken at present, however, as it is impossible to do much development work without railway facilities.

Canmore.

A serious accident occurred in the mines of the H. W. McNeil Company, whereby three men were killed and three men slightly injured. The names of the killed are Mathew Sarri, gangwayman, Gus Capleson, bratticeman, and Wm. Willmot, fire boss. The cause of the accident was an explosion of gas in the Carey vein. This vein gives off a lot of gas and only safety lamps are used. It appears that some time ago owing to the gaseous nature of the coal the Mine Inspector ordered that nothing but flameless explosives be used in this vein. In complying with this order the company obtained a supply of a safety explosive known as Negro Powder and gave strict orders to their shotlighters that nothing but Negro Powder was to be used for blasting the coal.

At the inquest on the victims of the explosion it was demonstrated that the explosion followed almost immediately after a shot had been fired in the main gangway, and that the shot hole had been charged with "Giant" instead of "Negro Powder."

It was the shotlighter's (Mr. Willmot) duty to see that only "Negro Powder" was used, but he had evidently allowed the miner to use "Giant" instead, with fatal results.

(Editor's Note.—This is an instance of the gross lack of a sense of responsibility on the part of workmen. Such cases are of more frequent occurrence than is supposed. In the above case the company had issued specific instructions that none but flameless powder should be used in the mine. The mine was known to be gaseous. Why a miner should wish to disregard orders and risk the lives of his comrades and himself, is not apparent. The lesson is a painful one. But it must not be lost. Flameless powder, and safety lamps, are absolutely necessary for the prevention of coal mine explosions. One criminally careless workman can in one moment render useless all precautionary measures instituted by a responsible management.)

SASKATCHEWAN.

Taylorton.

The Board of Arbitration which has been appointed under the Lemieux Act to deal with the labor troubles of the Western

Dominion Collieries of Taylorton met in Winnipeg. The chairman of the board was Judge Myers, while Frank Sherman represented the men, and J. Hannah represented the operators.

The chief points in dispute between the Coal Company and the men are—recognition of the union, wages scale, an eight-hour bank to bank day, employment of check weighmen, price of miners' supplies, and reinstatement of local union officers who have been discharged.

BRITISH COLUMBIA.

Rossland.

Mining is still looking busy in Rossland district. At the big producers development work is being kept well advanced and new ore bodies are daily being opened up and blocked out. While some of the mines could ship more ore, average shipments only will be maintained while copper demains at its present low price, as the managers can see no good in working out the mines and not getting a good price for their product, which is reasonable.

The hills surrounding the camp are being more thoroughly prospected at the present time than they ever were in the boom days, for the simple reason that the miners staked anything in those days, as there was a sale for any kind of wild-cat, but to-day the prospectors seems to know that a barren ledge is of little value to him and the ground now being staked in the South Belt in nearly all cases has a mineral showing of some little promise. Quite a number of the old abandoned claims have been sampled and restaked and where they are still held by the mining companies if there is any promising ore in sight overtures have been or are being made to the companies with a view to their being leased by ambitious miners.

The lessees of the Mayflower are taking out ore and the men on the Nest Egg have uncovered a body of copper ore. The Red Eagle has joined the shipping list, having sent a car of hand-picked ore to the smelter at Trail. They are still working and taking out good grade ore on the Blue Bird. The ore is at present being stored in the Homestake bins and will be shipped as soon as the rails are laid on the Homestake siding, but it is the intention of the Blue Bird management to have a siding and ore bins put on Blue Bird ground before very long. L. Carter, of Spokane, president of the company, states that his company will take over the mine and push development work immediately upon the expiration of the present lease, December sixth next. The ledge still retains its strong appearance and the prospects are good for the future. Of course the rock in this vicinity is much broken up and misplaced and the Blue Bird people can expect more or less trouble with their ledge at depth, but from its present appearance it looks as though it would continue downward in good form.

The Trail smelter has entered into a contract with the Snowstorm Mining Company, of Idaho, to treat 100 tons of ore from their mine per day, and the ore is now being received at the smelter. This ore carries over four per cent. copper. Mr. W. H. Aldridge, managing director of the Consolidated Company, in commenting upon the affairs of his company, states that the Centre Star, War Eagle and St. Eugene mines are all looking well at depth and that the smelter at Trail is working successfully and is one of the company's most valuable assets. The company has 1,150 men on its pay roll at Rossland, Trail and Moyie. Good progress is being made at Hosmer, where the C. P. R. is opening up their 4,000 acres of coal land. The 20 coal coal seams which are being opened up by means of two 2,800 foot tunnels have six or eight first-class workable seams among them. The 240 coke ovens are being rushed along as fast as possible. The total plant and equipment will cost over $1,500,000.

Shipments from Rossland for the week ended April 25th amounted to 5,065 tons.

Phoenix.

Work is going along nicely at the Granby mines, and while the shipments are not as heavy as they were during March, yet they are much greater than they were during the same month in either 1906 or 1907, and this despite the fact that one furnace is cold most of the time, in consequence of repairs being made. The furnaces will be connected up with the new dust chamber and gone over one at a time, so as to not restrict the output to too great an extent.

During the week ended May 2nd the Phoenix mines shipped 19,942 tons of ore down to the smelter, and that plant treated 22,005 tons. This gives 354,872 tons mined and 348,229 tons of copper-gold ore smelted during the year to above date. At the present moment No. 3 furnace is out of commission.

Diamond drill exploration has been resumed in the mines and will be continued during the life of a contract recently entered into with Boyles Bros. On the 400 foot level there is now in successful operation a method of self-dumping cars which was devised by the local manager, Mr. A. B. W. Hodges, and which is expected to reduce the cost of handling ore on that level. The cars, which are loaded by gravity in the stopes, are brought to the chutes by electric locomotives and by means of a wheel attached to the cars engaging in an incline track the big five tone cars are dumped while in motion and in a few seconds.

Work is to be resumed on the Joe Joe in the near future. The Tip Top is the only electrically equipped high grade property that is doing any work at the present moment in this district.

Nelson.

At a recent meeting of the Ymir Mines in London the hope was again advanced that the ore body now being sought at depth would be located in the due course of active development work and the directors were urged to assist all they could in the raising of funds to go ahead with this work. Diamond drilling is now in progress on the property. A rich strike is reported from the Gallagher mine in the Ainsworth district. The ore body, a soft iron carbonate, carrying gold and silver, is three feet thick. This ledge is all good sacking ore. The mine has produced considerable ore during the past six months, and there are now two carloads of ore all sacked and ready for transportation to the cars as soon as the trail will permit of hauling.

One cannot but admire the pertinacity of F. Griffiths the owner of the Westmount claim that is now shipping high grade silver ore. Mr. Griffiths, who has always had great faith in the Westmount, began its development over ten years ago. Being unable and somewhat unwilling to interest capital, he alone and unassisted drove a 1,000 foot adit and was successful in cutting the Westmount ledge where he knew it ought to show up. Often for as long as three months at a time he worked away in the wild, rugged hills without hearing the sound of a human voice or feeling the warm handclasp of a fellow-being. He is certainly made of the best material that goes into the make-up of a pioneer and deserves the reward that he is at present reaping. The last car of ore sent from the Westmount to Trail smelter averaged 405 ounces of silver per ton.

A new company has been organized to take over the affairs of the Lucky Boy, Trout Lake, and will be operated by them.

Work in the Sheep Creek district continues to show good results. On the Devlin Group, now being developed by a syndicate of Nelson men, the ore body is showing up strong. The ledge is of quartz, 6 feet in width, carrying free gold to the extent of $15 per ton. On the hanging wall there is a particularly rich pay streak about one foot wide, which will average $100 per ton in gold. Steady operation is the slogan of the management at the Queen mine, and they are now busy in

stalling their new compressor, hoist and other machinery. The Kootenay Belle, Mother Lode, Nugget and other Sheep Creek properties are showing up well.

Sixty men are now employed at the Silver Cup mine in the Lardeau. Geo. Alexander is acting as manager for the English interests, which now control the property. The Cup last month shipped 160 tons, the largest shipment in the history of the mine. The ore averaged 150 ounces silver, ¾ ounce gold and 40 per cent. lead. The 160 tons above mentioned were valued at $18,000. The mine is to be further developed by a long tunnel, which will be started fully 400 feet lower down the hill than any existing adit.

GENERAL MINING NEWS

NOVA SCOTIA.

Londonderry.—Messrs. T. J. and J. J. Drummond and Mr. Edgar MacDougall, all of Montreal, accompanied by Sir James Heath and Mr. Hamilton Benn, of England, visited Londonderry on April 30th. Two days were spent in inspecting the property of the Londonderry Iron and Mining Company. The East and West mines were examined, and the blast furnaec plant. A visit also was paid to the company's saw mill at Folly Lake.

Halifax.—Examinations for the purpose of granting certificates to managers, underground managers and overmen, under the Coal Mines Regulation Act, R. S., C. 8, S. 1, may be held somewhat earlier this year than last. The date, however, will shortly be announced. The board for the purpose of granting them certificates is made up as follows: Cape Breton District—Henry Mitchell, Dominion; A. B. McGillivray, Glace Bay; Isaac Greenwell, Sydney. Cumberland District—Joseph Moss, Springhill; Henry McArthur, River Herbert; Amos Billereau, Joggins. Pictou District—John Rigson, Stellarton; Charles J. Core, Stellarton; W. W. Gray, Westville. Inverness District—M. S. Beaton, Inverness; J. W. Johnston, Mabou; Robert D. Anderson, Halifax.

The Dartmouth Ferry Commission have accepted the offer of the Inverness Coal Company for the supply of 5,000 tons of coal of 2,240 pounds. The company offered No. 1 slack at $2.15 per ton, to be delivered at Commissioners' wharf, delivery to commence 1st May or sooner if required; to be delivered in schooners, steamers or barges of 800 tons capacity, free over ship's rail; weight as per scales. They also offered 1,000 tons run of mine at $3.40 per ton. This is the lowest offer for a number of years. The Gowrie Company offered coal at $2.50 per ton. The Mabou Coal Company's offer was for $2.65 per ton, weight to be taken as bill of lading, delivery at commence about 15th May or on opening of navigation, and completed 15 December. They also certified coal against spontaneous combuction.

Port Hood.—The miners of the Port Hood-Richmond Railway-Coal Company stopped work on May 1st. Not one word of warning was given the management. Evidently the men thought that the time was opportune. The summer's output of coal has been sold in advance, and a continued strike would embarrass the company seriously.

The miners struck for a 15 per cent. increase on the general labor pay roll and for 5 cents a ton increase on coal cutting. They gave no indication of their intention and the management was taken entirely by surprise. On May 5th the men resumed work. A conciliation board is to be appointed.

QUEBEC.

Montreal.—On May 1st there were seven Dominion Coal boats in Montreal. Thirty-four thousand four hundred and sixty-four tons of coal were being unloaded. On April 30th 6,355 tons were unloaded at Quebec.

To encourage research work in the study of the structure of metals, etc., arrangements have now been made to offer a scholarship at McGill University. The particulars are as follows:

The holder shall be preferably a graduate of the metallurgical engineering course. The appointment will not necessarily be limited to one year, provided funds are available. The student will receive in the first place a salary of $500 per year, and from $100 to $200 per year will be available for defraying the cost of supplies and apparatus.

The object of the research will be to ascertain the effect of the structure of metals (as revealed by the microscope) on their mechanical properties and their wearing quality; particularly in the case of steel rails, axles, tires and chilled iron wheels.

Provision will be made for enabling the holder of this scholarship to visit certain steel works and rolling mills, so as to learn the effect of mechanical treatment during the process of manufacture.

The student holding this post will be expected to assist in the laboratory teaching as far as it relates to the special work on which he is engaged.

The student would be termed Research Fellow in Metallurgical Engineering.

For the first year the necessary funds have been promised by Mr. Milton L. Hersey, M.A. Sc., who has already contributed an annual prize to students in the metallurgical course at McGill.

The work will be caried on under the direction of Dr. A. Stansfield, the professor of metallurgy, who, for a number of years, has made a special study of the heat treatment of steel and the nature of steel rails.

ONTARIO.

Belleville.—The Deloro works of the Deloro Mining and Reduction Company are operating continuously, almost up to capacity, on Cobalt ores. One hundred and fifty men are on the pay roll. Additions to the plant are proposed. Weekly shipments of bullion are now being made. In the first week of May fifty-one ingots were shipped to London. The total weight was 2,2550 pounds.

From the Henderson talc mine, near Madoc, large shipments will soon be made. A mill for grinding this superior talc is to be installed.

The Silver Leaf Mine, Cobalt, has shipped one car of high grade ore to the Deloro smelter. The arsenic plant, running in conjunction with the smelter, is producing arsenic regularly. The stamp mill is in commission on a test lot of gold arsenic ore from the Lawson-Pearce mine, near Marmora.

Cobalt.—The discovery of a new vein on the Temiskaming 200 foot level, is creating a sensation. The vein contains 8 inches of silver. A new find on the Buffalo is also reported.

By the accidental explosion of dynamite two men were killed at La Rose mine on May 4th. The men were working on the second level. They were found about 1 o'clock. One of them, a Galician, was dead. The other, Leonard, a Frenchman, died shortly after being taken out of the mine. It is stated that both men were inexperienced.

ALBERTA.

Frank.—The Bellevue mines, belonging to the Lille Collieries, have resumed work. Thirty miners are employed.

The Frank coal mine of the C. A. C. Company was inspected on April 29th. Inspector Heathcote found it in good condition. It has been closed for three months.

BRITISH COLUMBIA.

Fernie.—On January 1st, 1909, the agreement between the C. P. R. and the Crow's Nest Pas Coal Company will expire. By the terms of this agreement the C. P. R. was prohibited from engaging in coal mining in the Crow's Nest district. Preparations are now being made at Hosmer, where the C. P. R. owns 4,000 acres of coal lands, to erect plant and houses. One million five hundred thousand dollars will be expended. Five hundred men are now employed in opening up. Two cross-cut tunnels, each 2,800 feet long, are being driven to intersect twenty seams of coal, six of which are good, workable seams. In these tunnels a system of compressed air haulage will be installed. Commenced next January shipments of coal will be increased until an output of 3,000 tons per day is reached. During the summer 240 coke ovens will be completed. For shipping the coke a new type of steel coke car is to be introduced. Each car will have a capacity of forty tons as compared with the wooden box cars, which only hold twenty-two tons. The C. P. R. also owns forty square miles of coal lands on the Elk river, forty miles north of Michel, in the Crow's Nest district.

Mr. W. H. Aldridge, managing director of the Canadian Consolidated Mining and Smelting Company, is acting as chief consulting engineer on behalf of the railway company.

Phoenix.—The first fatal accident in many months took place on Sunday, 26th April, at the Granby Mines. Two men fell from the bench on which they were working in Stope No. 61, on the 300 foot level, on to a muck pile 25 feet below. Both men were probably killed instantly. The bodies were not discovered until some time after the accident.

Revelstoke.—For fourteen years the Silver Cup mine has produced ore steadily. It employs 50 to 75 men. Last year a new compressor, operated by water power, was installed. The Silver Cup ore averages 150 ounces of silver, ¾ ounce of gold and 40 per cent. lead per ton. In March it shipped $18,000 worth of clean ore.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

A Glasgow syndicate has leased nearly 300 acres of peat land in Bowness-on-Solway in North Cumberland. The peat will be subject to special treatment for manufacturing and other purposes.

The wages of coal miners in Cumberland have been reduced 2½ per cent.

A thick seam of coal has been struck at a workable depth on Thorne Moor, Yorkshire, proving the existence of coal over a stretch of ten miles of country between Bentley and Thorne.

FRANCE.

The tin deposits at Montebras, in the department of La Creuse, are to be developed by Anglo-French company, known as the French Mining Syndicate, capitalized at £250,000. Some of the tin occurs in a white feldspathic rock which yields as a by-product a fine quality of china clay.

PORTUGAL.

A gold mine of exceptional richness is reported to have been discovered in Northern Portugal, and a great rush to the district has set in. Auriferous quartz veins have long been known to occur in that region, especially in the Provinces of Minho and Traz-os-Montes, lying north of the Dowro.

NORWAY.

The production of iron ore in 1907 showed a large increase, the output last year being 130,000 tons, against 80,000 in 1906. Of the year's product, 90,000 tons were exported, in the form of ore, while 40,000 tons were treated by magnetic separation and briquetted.

The copper mining industry during 1907 made much progress. Existing mines largely increased their output, and a number of new enterprises wer started. The Sulitelna mines were the heaviest producers, and of their output 11,900 tons of copper pyrites were treated on the spot, yielding 701 tons of nearly pure copper.

AUSTRALASIA.

The Mount Lyell Mining and Railway Company has just installed at its reduction works, Queenstown, Tasmania, two large turbo-blowing engines, which with the smaller one which has been in use for a year will make the finest blowing plant in Australasia. The practice in pyritic smelting at the works is advancing.

An official report on the Wolfram deposits near Marysville, Victoria, states that this mineral has been found over a tract of country said to be two miles square. A wide field is presented for further prospecting, as it is by no means certain that either the best alluvial or the best lode Wolfram has yet been found.

The prospects of the tin-dredging industry in Northeastern Tasmania are encouraging. The Dorset bucket dredging plant in the Ringarooma valley is handling between 12,000 and 14,000 cubic yards of ground per week and other plants are making a fair turnover.

In boring for coal at Cape Ford, Northern Australia, a depth of 1,459 feet has been reached. Several small seams of coaly matter have been cut and, indications being considered favorable, a more powerful plant is to be employed.

SOUTH AFRICA.

Several large amalgamations of mining companies have taken place or are in progress. The most important of these which is now under consideration by the companies affected, is that of the East Rand Propietary Mines, which will absorb several other enterprises embracing a total of 2,801 claims. It is estimated that the amalgamation will effect a reduction in working costs amounting to 1 shilling per ton.

A lode has been struck in the City Deep shaft on the Rand at a depth of 2,865 feet, showing good assay values across a 42 inch working face. This result is regarded as highly encouraging in regard to the future of the Rand mining industry.

The gold production of Rhodesia for the first three months of 1908 was 147,141 crude acounces, as against 134,417 ounces for the corresponding months of last year.

UNITED STATES.

The Montana Mine Owners' Association has secured control of the smelter of the Idaho Smelting and Refining Company at Ponderay, Idaho, which has been closed since last fall, and will increase the capacity of the plant from 250 tons to 1,000 tons per day, giving employment to about 300 men. It is proposed to spend $100,000 on improvements and the plant will be equipped for treating copper, a refinery being added. The name of the operating company will be the Montana and Idaho Smelting Company.

Oil and gas have been discovered near Colorado Springs, Colorado, and a company capitalized at $1,000,000 has been organized to develop the field. They have secured control of about 6,500 acres.

It is proposed to substitute cement pillars for mine timbers in a number of Leadville, Col., mines. A series of experiments has been arranged for and should cement prove satisfactory it will be largely adopted.

The sum of $195,000 has been appropriated by the American Congress to be used by the Geological Survey in studying means for lessening the number of mine accidents.

Company Reports.

INTERNATIONAL COAL COMPANY.

Dividends Paid in 1907 Aggregate 5½ Per Cent.

The annual report of the International Coal and Coke Company, Limited, operating collieries at Coleman, Alta., has just been issued. It is signed by A. C. Flumerfelt, the president, and runs as follows:

The net profits for the year, after paying all operating expenses at head office and mine, amount to $251,049.21 (being 8.9 per cent. on the outstanding capital), which sum has been derived from the various departments of the company's business, together with the sale of coal and coke, receipts on account of lots sold from the company's townsite and returns from water and electric light supplied by the company to the people of Coleman.

On the 1st of February, 1907, a dividend of 1 per cent. on the capital stock of the company was paid; a similar one on the 1st of May, which was increased to 1½ per cent. on the 1st of August and 2 per cent. on the 1st of November, making in all 5½ per cent., aggregating $154,000, and as you will see by reference to the balance sheet on the opposite page, the handsome sum of $97,049.21 was carried to surplus account for the year.

Coal produced—for the year under review—was 372,480 tons, of which 61,998 tons were sent to the company's ovens and produced 39,121 tons of coke, all of which found a ready sale, the balance being marked as coal.

The total amount of the pay roll for 1907 was $437,723.19; average number of men employed, 465; days worked, 236; the average tonnage being 1575. During the year there were some additions made to the plant (expenditure under this head being $45,943.57), which included coke ovens, additions to haulage plant, a Bradford breaker, snow sheds and a thoroughly well-equipped wash house for the men, all of which were deemed necessary in the company's interests and approved by the board.

STATISTICS AND RETURNS.

The output for the month of April at the collieries of the Nova Scotia Steel and Coal Company is about the same as that for the month of March. Number 4 colliery is just beginning to produce coal again, and allowing for two days of which the mines were idle the general output will be about the same as preceding month.

Following are the figures:

	Tons.
No. 1	71,612
No. 3	2.,760
No. 4	576
No. 5	7,261
Total	55,212

The coal shipments of the Novo Scotia Steel Company for the three months were as follows:

	Tons.
Shipments March, 1908	28,757
Shipments March, 1907	21,854
Increase March, 1908	6,903
Shipments 3 months, 1908	117,737
Shipments 3 months, 1907	86,829
Total 3 months, 1908	30,908

The Crow's Nest Pass Coal Company, Limited, report the output of the collieries for the week ending May 8th as 17,453 tons, a daily average of 2,909 tons.

The output of the Crow's Nest Pass collieries for the week ending May 1 was 18,826 tons, or a daily average of 3,137 tons.

SMELTER RECEIPTS.

	Week.	Year.
Granby	19,905	334,530
Consolidated	4,726	88,002
Le Roi	371	24,806
Other mines	.....	1,511
Total	371	26,317

The total receipts at the various smelters for the past week were 25,002 tons, and for the year to date 454,579 tons.

Manager Levy cabled the London office of the Le Roi Two Mining Company the following report of the operations of the Josie and Vancouver for the month of March: "Josie Mine report for last month—shipped 2,440 tons. The net receipts are $52,947, being payment for 3,275 tons shipped, and $2,293, being payment for 151 tons of concentrates shipped. In all $55,240. Vancouver mine report for last month: Shipped 50 tons. The net receipts are $4,423, being payment for 60 tons shipped, and $1,024, being deferred payment for 121 tons concentrates. In all $5,447. No lead concentrates shipped."

Shipments from the Springhill Collieries of the Cumberland Railway and Coal Company amounted to 33,457 tons for the month of April.

BRITISH COLUMBIA SHIPMENTS.

Following are the shipments for the week ending April 25 and year to date:

Boundary shipments—

Mine.	Week.	Year.
Granby	19,905	334,530
Other mines		462
Total	19,905	334,992

Rossland shipments—

Centre Star	3,242	55,040
Le Roi	371	24,806
Le Roi No. 2	114	10,325
Other mines	.....	500
Total	2,727	90,671

Slocan-Kootenay shipments—

St. Eugene	233	8,332
Whitewater	23	445
Whitewater, milled	280	4,620
Poorman, milled	250	3,350
Queen, milled	185	2,950
Second Relief, milled	145	1,520
North Star	139	1,004
Standard	86	532
Rambler-Cariboo	22	457
Ruby	43	141
Milly Mack	102	128
True Fissure	18	50
Other mines	.....	13,352
Total	1,526	36,748

For the first four months of the year the Dominion Coal Company's output is 237,580 tons ahead of the corresponding period last year. The figures are as follows:

	1908. Tons.	1907. Tons.
January	314,108	252,348
February	285,649	225,588
March	346,529	212,931
April	298,745	316,384
	1,245,031	1,007,151

DOMINION COAL OUTPUT FOR APRIL.

	Tons.
No. 1	48,000
No. 2	58,721
No. 3	32,279
No. 4	38,528
No. 5	42,757
No. 6	20,453
No. 7	713
No. 8	18,072
No. 9	27,948
No. 10	12,979
	300,450

The following report of the operations of the Le Roi mine for March was cabled to the London office of the company: "Shipped from the mine to Northport during the past month 6,700 tons, containing 2,680 ounces gold, 4,600 ounces silver, 170,000 pounds copper. Expenditure on development work during the month, $7,250."

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp and those from January 1st to date:

	Week end April 25.	Since Jan. 1.
Crown Reserve	40,000	40,000
Cobalt Central	10,600	107,180
La Rose	292,200	1,729,452
McKinley	61,000	1,063,000
Nipissing	101,170	1,044,600
Silver Queen	44,000	524,000
Silver Leaf	70,800	132,800

The total shipments for the week were 680,170 pounds, or 340 tons.

It will be noticed that the Crown Reserve mine has joined the list of shippers.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:

	Week end May 2.	Since Jan. 1.
Buffalo	.....	517,520
Coniagas	.....	380,910
Cobalt Lake	.....	180,610
Crown Reserve	.....	40,000
Cobalt Central	.....	107,180
City of Cobalt	110,520	338,600
Drummond	.....	92,340
Foster	.....	168,600
Kerr Lake	.....	330,710
King Edward	.....	127,240
La Rose	132,200	1,861,652
McKinley	60,900	1,123,900
Nipissing	64,030	1,108,630
Nova Scotia	.....	120,790
Nancy Helen	.....	140,420
O'Brien	126,980	1,635,570
Right of Way	.....	60,120
Provincial	.....	143,210
Standard	.....	39,730
Silver Queen	.....	524,200
Silver Cliff	.....	52,000
Silver Leaf	.....	132,800
Townsite	.....	85,100
Temiskaming and H. B.	.....	539,000
Temiskaming	.....	237,250
Trethewey	192,800	679,916
Watts	.....	114,430

The total shipments for the week were 687,430 pounds, or 343 tons. The total shipments from January 1 to date are 10,882,918 pounds, or 5441 tons.

The shipments for the month of April practically tripled those of 1907, when 533.15 tons of ore were shipped out from the camp. For April, 1908, the shipments were 49 cars and a total of 2,634,240 pounds. These shipments for the month of April are particularly notable in view of the fact that since April, 1907, several large concentrating plants have been installed

in the camp, and while the number of ounces of silver will be increased thereby, a large shipping tonnage will be cut off in consequence.

The shipments from the camp for the month ending April 30 are as follows:

	Cars.	Pounds.
Mc-Kinley-Darragh	7	366,240
Provincal	2	93,210
Nipissing	5	224,430
O'Brien	4	251,250
Buffalo	2	107,980
La Rose	15	854,200
Temiskaming and H. B.	2	121,000
Kerr Lake	1	60,330
Nova Scotia	1	40,000
Cobalt Central	2	57,480
Crown Reserve	1	40,000
Silver Queen	1	44,000
Silver Leaf	1	70,800
Trethewey	3	192,800
City of Cobalt	2	110,520
Total	49	2,634,240

The shipments for the first four months of the current year are much heavier than those of the same period for 1907.

Fifteen mines shipped 1,317.55 tons in April, 1908. The shipments for April, 1907, only amounted to 535.15 tons. Cobalt shipped nearly three times as much in April, 1908, as it did in April, 1907.

Jan.	Feb.	March.	April.	Total.
1325.89	1173.80	1832.79	1317.53	5650.01
980.11	903.71	1027.59	533.15	3444.56

Increase in tons for first four months, 2205.45.

The above increase is the more remarkable owing to the fact that many shipping mines that formerly sent second grade ore to the smelter now ship concentrates.

Another consideration is the high standing for the first four months of 1908 of the new shippers.

The Watts, Temiskaming and Hudson Bay, Temiskaming, City of Cobalt, Silver Leaf, Provincial, Nova Scotia and Nancy Helen now rank among the camp's most regular shippers.

The shipments for week ending April 25th went to the following smelters: La Rose to Denver; Nipissing to U. S. Metal and Refining Company, Carteret, N. J.; Crown Reserve, to Ledoux and Company, New York; Silver Queen to Copper Cliff; Silver Leaf to Deloro; McKinley-Darragh to Pennsylvania Smelting Company, Carnegie, Pa.; Cobalt Central to Rickett and Banks, Waverly, N. J.

The Transvaal gold output in April, as officially reported in London, was 565,832 ounces, fine, a decrease of 9,069 ounces from the output of March. The April output last year was 537,019 fine ounces; in 1906, 439,243. Value of the April output, calculated on the basis of the above estimate, compares as follows:

April, 1908	$11,924,000
March, 1908	12,210,000
February, 1908	11,510,000
January, 1908	11,900,000
December, 1907	12,393,000
April, 1907	11,405,000
April, 1906	9,329,000
April, 1905	8,477,000
April, 1904	6,497,000
April, 1903	4,839,000

MARKET REPORTS.

Coke.

May 8th—Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.55 to $1.65.
Foundry coke, prompt, $2.10 to $2.25.

Pige Iron.

May 8th, Pittsburg—

No. 2 foundry, $15.40 to $15.65.
Bessemer, $16.90 to $17.15.
Basic, $16.15 to $16.40.
Malleable, $16.90 to $17.15.
Southern No. 2, $16.40 to $16.90.

Other Metals.

Tin, Straits, 30.55 cents.
Copper, prime lake, 12.75 to 12.85 cents.
Lake, arsenical brands, 12.70 to 12.80 cents.
Electrolytic copper, 12.70 to 12.85 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.20 cents.
Spelter, 4.67½ cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.65 to 8.70 cents.
Aluminium, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 to $26 per ton.
Bismuth, $1.75 per pound.
Quicksilver, $45 per 75 pound flask.

Silver Prices.

	New York. Cents.	London. Pence.
April 16	54⅞	25 5-16
April 17		
April 18	54⅝	25 3-16
April 20	54⅝	
April 21	54⅝	25 3-16
April 22	54⅝	25 3-16
April 23	54⅝	25 1-16
April 24	54	24⅞
April 25	53½	24 11-16
April 27	53⅝	24 9-16
April 28	53⅝	24 11-16
April 29	53½	24 11-16
April 30	52¾	24 5-16
May 1	52¾	24 5-16
May 2	52⅞	24⅜
May 4	52⅞	24⅜
May 5	52½	24 3-16
May 6	52	24
May 7	52⅜	24 3-16
May 8	52⅛	24⅛
May 9	52¼	24 1-16

Silver.—The U. S. Mint has made no purchases of silver for the past four weeks. The consumption, at present, of the world, is far behind the production. India has not been a buyer for some time. China has been selling silver abroad. Since the first of the year England has shipped to India about 50 per cent. of the amount going out on the corresponding period of last year, or £2,310,438, against £4,409,784.

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The mining laws of Ontario are liberal, and the prices of mineral lands low.

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The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

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Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

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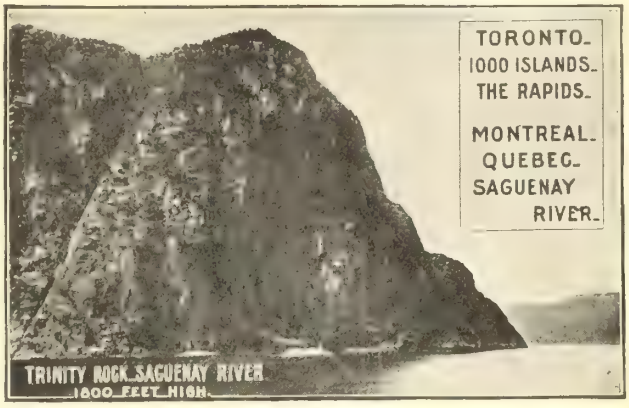
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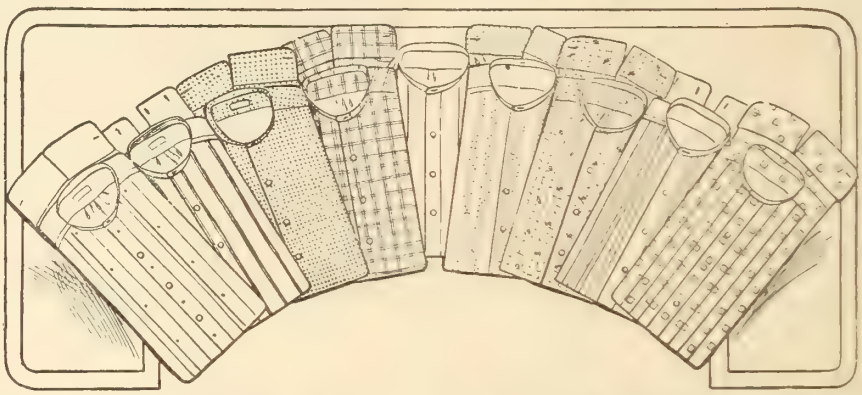
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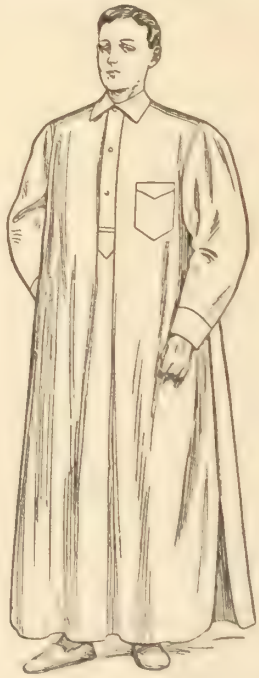
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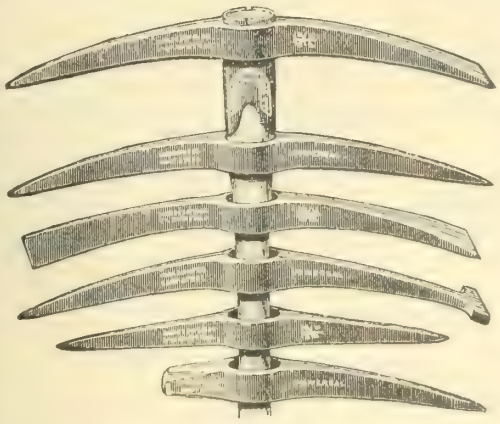
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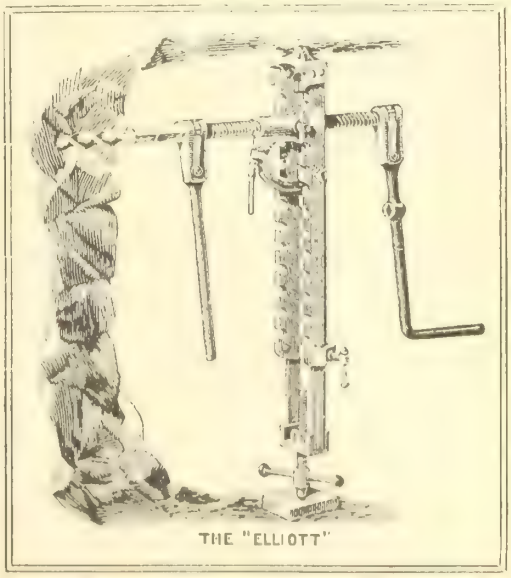
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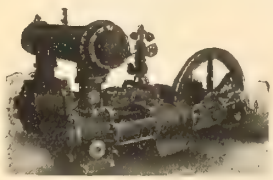
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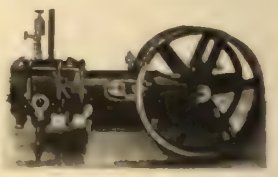
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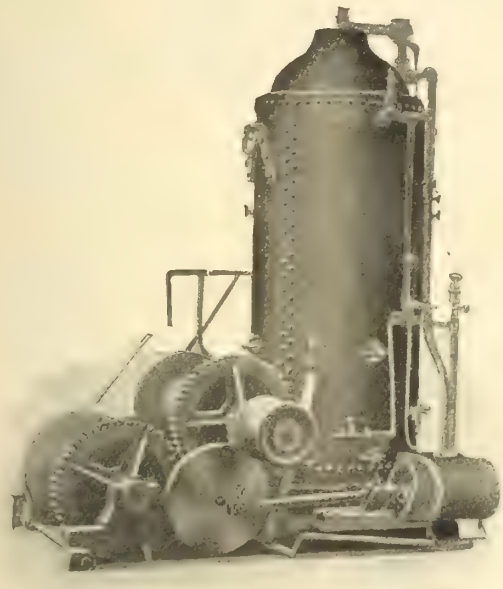
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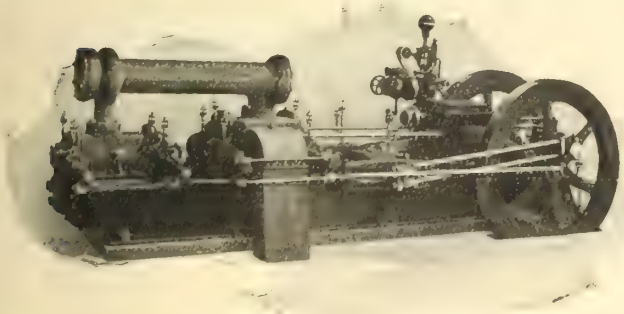
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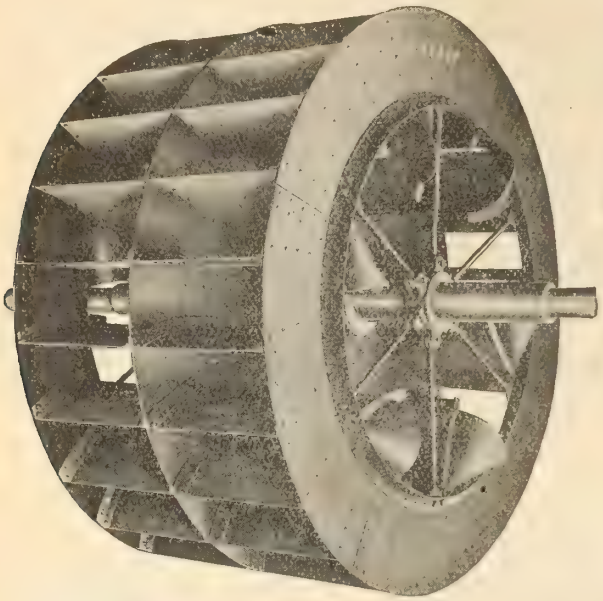
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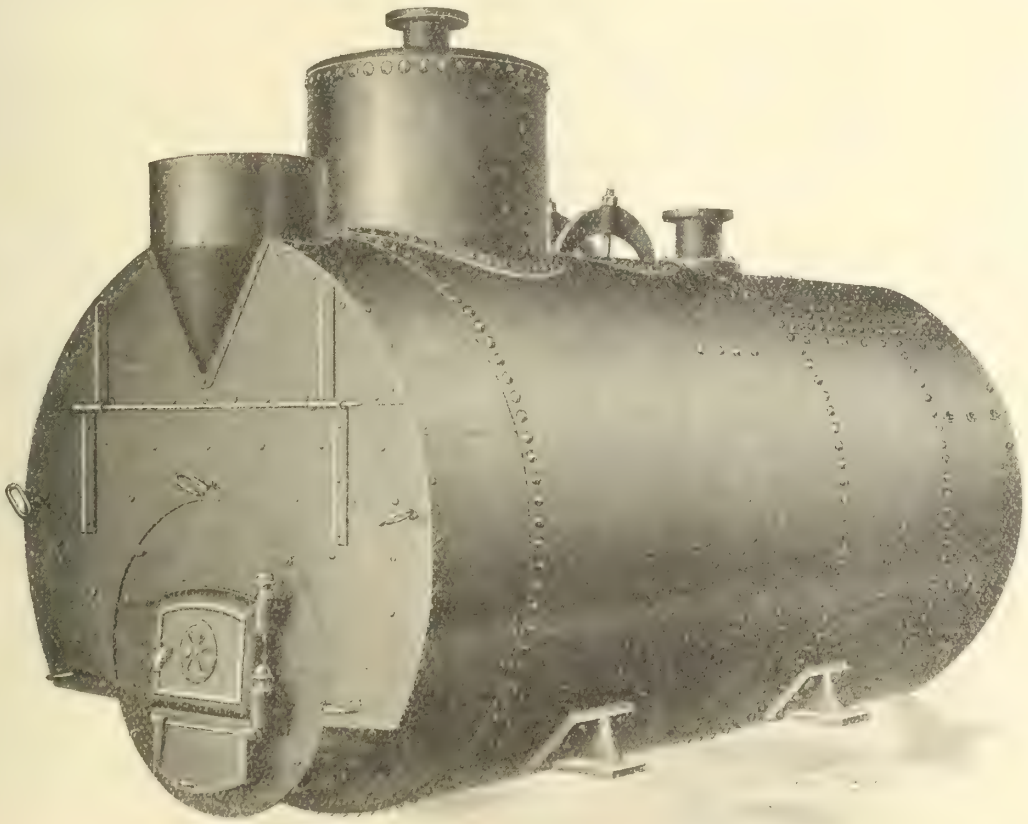
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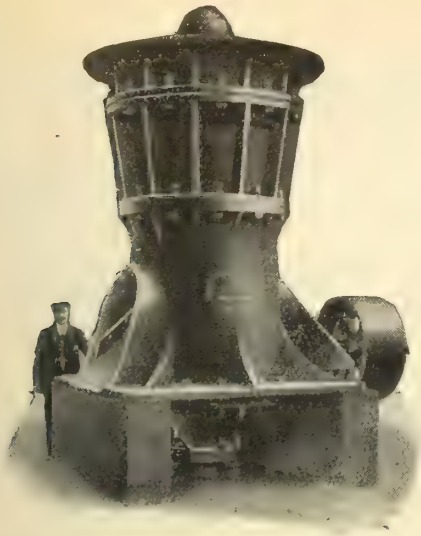
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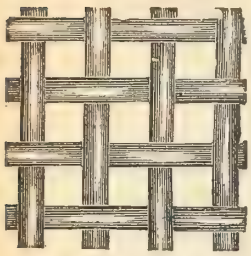
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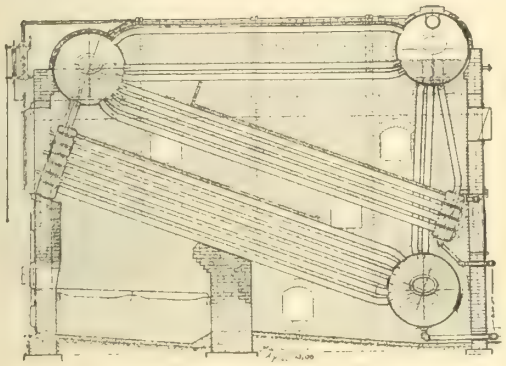
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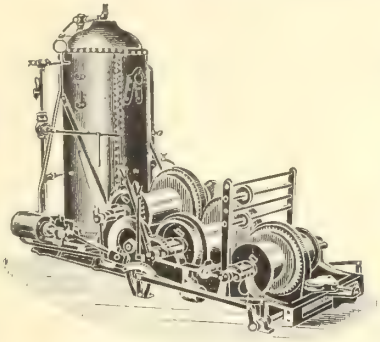
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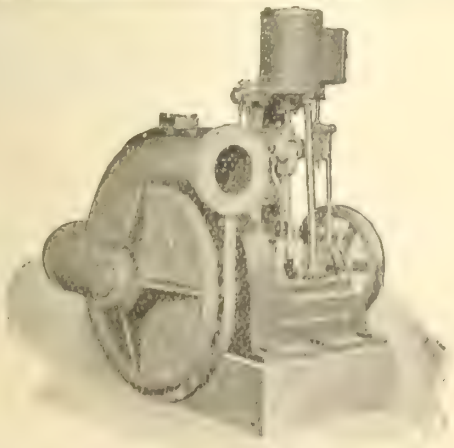
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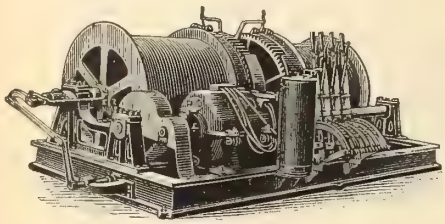
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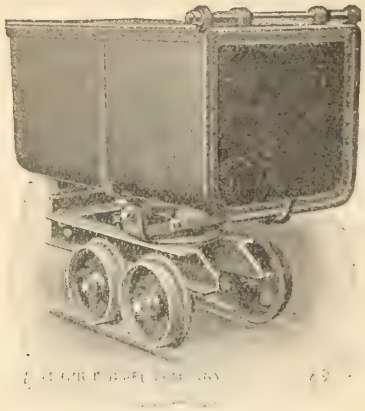
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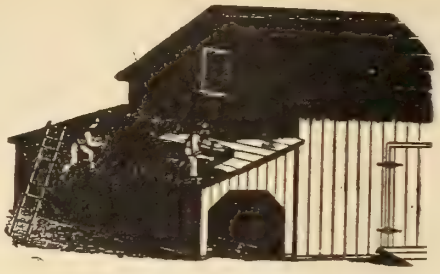


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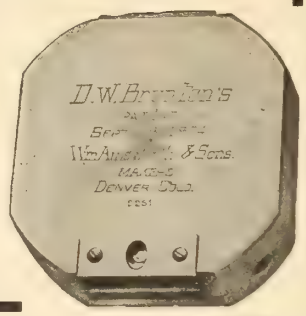
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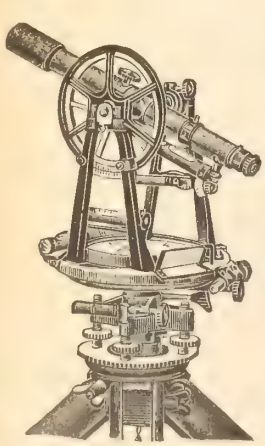
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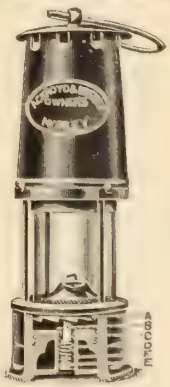
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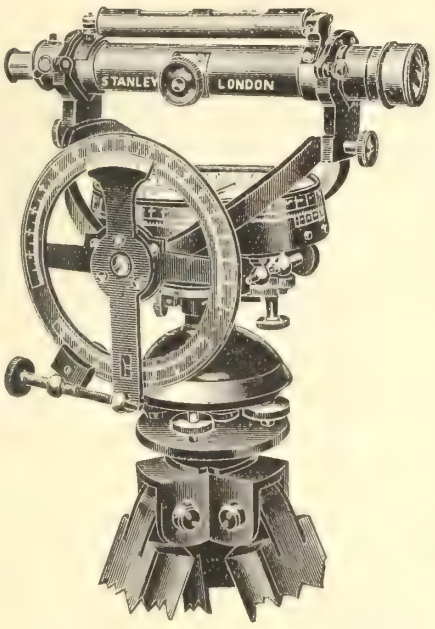
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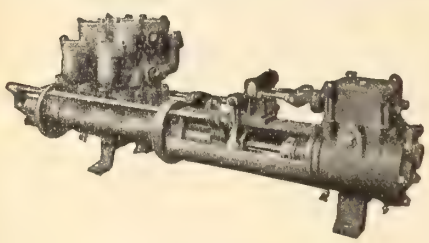
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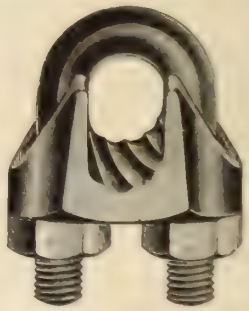
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MINING: S. S. Fowler, M.E., Nelson, B. C.,; Frederick Keffer, M.E., Anaconda, B.C.; A. B. Willmott, M.E., Sault Ste. Marie, Ont.; J. C. Gwillim, M.E., School of Mining, Kingston, Ont.; J. Obalski, Inspector of Mines, Quebec; J. Bonsall Porter, M.E., McGill University; H. Mortimer-Lamb, Sec. Can. Min. Inst.; John E. Hardman, M.E., Montreal; Fritz Cirkel, M.E., Montreal; George W. Stuart, M.E., Truro, N.S.

METALLURGY: Hiram W. Hixon, M.E., Mond Nickel Company, Victoria Mines, Ontario; Stafford F. Kirkpatrick, School of Mining, Kingston, Ontario; A. P. Scott, Dominion Iron & Steel Company, Cape Breton.

COAL: Hon. Robert Drummond, Stellarton, N.S.

NATURAL OIL AND GAS: Eugene Coste, M.E., Toronto, Ont.

CEMENT: Manley Baker, M.A., School of Mining, Kingston, Ont.

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ONTARIO MINING ADMINISTRATION AND POLITICS.

We have watched, with some degree of concern, the course taken by the partizan press of Ontario in criticising and defending the administration of mining law in this province. The organs of both parties have gone to regrettable lengths in misstatements and palpable untruths.

It has remained, however, for the Toronto Globe to cap the climax of recklessness. In its issue of May 22, in an editorial entitled "Government Claim-Jumping," it gives utterance to an unqualified condemnation of the mining policy of the Provincial Government. The editorial will inevitably affect public confidence in the mining industry. That it is inspired by political agitators and that its writer has either been an ignorant dupe, or has deliberately closed his eyes to the truth, are facts that he who runs may read. In any case the "Canadian Mining Journal" is called upon to correct the malicious untruths and half-truths thus put in circulation.

Firstly, it is germane to our subject to remark that it would become the Globe to maintain a discreet silence on topics pertaining to mines and mining. In fact it has little right to pose as the champion of right. Last year, when the mining fever was at its height, the Globe, despite full information as to the character of the projects it was aiding and abetting, continued to publish the most flagrant specimens of wild-cat advertisements. In this respect, in view of the Globe's actual standing and the rarified moral atmosphere in which it moves and has its being it was more offensive than its worst contemporaries. Only one Toronto daily chose the path of decency and honour—and that one was not the Globe. As between tainted money and serving the true interests of the people, the Globe chose the former alternative. So much for the past.

Early in June an election is to take place. To the "Canadian Mining Journal" there is neither politics nor party. Hence, so long as the industry which it represents is not injured, the "Canadian Mining Journal" has no concern in the battle. But when, in the course of an election campaign, a newspaper attacks the very foundation of that industry, in its intemperate desire to discredit the work of a department, it is high time for us to speak.

The Globe states that the excuse made for "Government claim-jumping" is that the "discoveries were not made when the patents were obtained." In what sense this can be called an excuse we cannot see. Under

the present Mines Act discovery is essential. If the Government inspectors are not shown satisfactory evidence of discovery they are in duty bound to throw out the claim. This is an integral part of the Mines Act. Its operation has entailed hardships. It is by no means a perfect law. But it is law and is accepted and must be lived up to.

That the Mines Act is perfect is not claimed even by those who framed it. That the administration of the Department of Mines has been flawless is not to be urged for a moment.

On the other hand we speak whereof we know when we say that the inspectors, upon whose shoulders falls the onus of carrying out the letter of law, are straightgoing, carefully selected, professional men. For the benefit of the Globe we may add that these inspectors are chosen with absolutely no reference to politics. This is a rare and valuable feature and has an important bearing upon the administration of the law. Indeed it goes far towards rectifying manifest imperfections in present legislation.

The last few years have witnessed an expansion in the mineral industries of Ontario, for which the discovery of Cobalt is not wholly responsible. And the Bureau of Mines has done notable work before and since that epoch-marking discovery. Ontario does not lose by comparison with any other province of the Dominion. Let its Department of Mines be measured by these standards, and not by the criminally irresponsible abuse of the Globe.

There is in the far west a weekly that makes no pretensions to piety. Its humor is unconventional, possibly a trifle mediaeval. Often its columns are frankly objectionable. We need not make the comparison more invidious by giving the name of this knight-errant of journalism. But we may be allowed to express an open preference for the outspoken honesty of the western sheet as opposed to the unscrupulous, bitter, and deplorable partisanship of the psittaceous Globe.

SLOCAN ZINC ORES.

It is reported that, after long deliberation, the Supreme Court of the United States has reversed the decision of the Board of Appraisers in regard to the dutiability of zinc sulphide. This will end the interminable discussion as to the interpretation of the word "calamine." Whilst the appraisers were technically right in objecting to the classification of zinc sulphide as calamine, yet the logic of the situation demanded equal rights for either the carbonate, the silicate or the sulphide of the metal. Therefore the 20 per cent. ad valorem duty on zinc ores entering the United States from Canada is no longer to be collected.

From the Slocan zinc concentrates have been shipped as far as Wales. The United States smelters, however, have been the principal purchasers, and it was at the instance of the latter that the present question of duty was taken up and settled.

The difficulty has not been without incidental benefit. The Canadian smelter, now about to commence operation near Nelson, will aid in the development of the Slocan, especially in the case of small shippers. The removal of the ad valorem charge will encourage competition.

TWENTY YEARS' PROGRESS IN SOUTH AFRICA.

The recently elected president of the Institution of Mining and Metallurgy, Mr. Alfred James, in his inaugural address summarized the advances and improvements in the methods of mining and milling South African gold ores. Mr. James entered upon his first professional engagement in South Africa twenty years ago. His review covers the intervening period.

Twenty years ago the metallurgy of gold received but scant attention. Technical papers on the subject were rare. Practice generally was crude and mining and milling methods were largely rough and ready. In South Africa operators were confronted with the problem of extracting the gold from heaps of tailings assaying in places as much as 1 ounce per ton.

The advent of American mining engineers not only brought about an era of elaborate and expensive installations, but induced a spirit of eager competition that reacted beneficially upon all concerned. It is noteworthy that the best of the British engineers have more than held their own ground.

Amongst other evidences of change and improvement it may be noted that in 1888 comparatively few gold mines employed assayers. To-day the metallurgist is supreme. But success was gradual. The first filter presses were failures. Now they are an acknowledged necessity. Like instances are not wanting.

Mr. James sums up, as worthy of notice, the following improvements in mining and milling:

> The sorting of waste rock from reef matter to be milled.
>
> The use of separate crushing stations containing high capacity crushers.
>
> The general adoption of mechanical transport for the ore from the mine to the mill.
>
> The provision of bins of great storage capacity to provide against breakdown in mine or hoisting engine.
>
> The provision of special water supply—usually with its acidity neutralized—for the mill.
>
> The use of heavy stamps. In place of 850 pound stamps and a per diem output of 1½ to 2¼ tons per stamp, 1,500 pounds to 2,000 pound stamps with a capacity of 6 to 10 tons per stamp are not uncommon.

The use of long, unbroken silvered plates for mill amalgamation, and of shaking plates for forced amalgamation, after tube mills. At Waihi the plates are installed in a separate building.

The adoption of regrinding appliances. The cost of tube milling African sands is now reduced to 5½d. per ton re-ground. It is doubtful, however, whether tube mills are more economical in running than stamps for increas- output, as the consumption of power is high.

The provision of automatic weighing and sampling devices.

The introduction of the cyanide process for recovering gold from sands and slimes.

The use of improved mechanical roasting furnaces.

The provision of tailings wheels for elevating pulp. These are probably to be superseded by three-throw pumps of the type used for filter pressing.

The practical effect of these improvements may be measured by the fact that ores, formerly looked upon as impossible of commercial treatment, are now considered profitable. Thus ore containing 6 dwt. of gold per ton is now mined and milled at a good profit, and large plants have been erected to treat sand carrying less than 1½ dwt. of gold per ton and slime assaying only ½ dwt.

In concluding his thoughtful address, Mr. James makes a strong plea for the standardization of mine accounts. We heartily endorse this request. The need is universal.

HIGH GRADING.

In our last issue we made brief reference to the prevalence of "high grading" in Cobalt.

Circumstances have since arisen that make strong comment necessary.

On May 12th a Cobalt jeweller was arrested in Toronto. He had in his possession ore to the value of about eight hundred dollars. When questioned by his captors the man informed them that graft of this sort was so universal in Cobalt that he felt obliged to secure a share. The answer is naive. Also it is significant.

The Mine Owners' Association employed the detectives that captured this particular theif. Apparently the Association is the only active deterrent influence.

But why should not the workmen take it upon themselves to aid in suppressing this systematic looting? Would it not be wiser and better for the miners to indulge in some honest efforts to remove the blot of "high grading"? If the labor leaders were as active in their opposition to wrongdoing of this sort as they are in fomenting useless strife, there would be far fewer grievances and far less unnecessary friction.

A thief is defined in the dictionaries as one who deprives another of property secretly. Inadequate as this definition is, it serves the purpose well enough.

Judged by the moral standards nominally accepted in social life, many of our successful financiers, promoters and politicians are thieves. Occasionally a member of one of these classes oversteps the legal boundaries of right and wrong and is caught. Mostly, however, their operations are within the law, or cleverly evasive of the law.

In the learned professions there is no pronounced tendency to misappropriation. A doctor, an engineer or a lawyer loses caste if he is suspected of carelessness in handling the property of others. The commercial and industrial classes of Canada are as clean-handed as those of any other country in the world.

What are usually termed the laboring classes are not looked upon as displaying marked evidence of dishonest propensities. On the contrary, it is popularly believed that the honest toiler is the salt of the earth, and some varieties of modern socialism (much misused name!) inculcate the dogma that none but the laborer is honest at all.

Possibly in no calling is there such need of intelligence and resourcefulness as in mining. The good miner is, to our mind, one of the best types of producer. His work is not specialized to such an extent as obtains in modern manufacturing establishments. Neither is it beset with more dangers. But the dangers and the requirements are such as encourage a sense of personal responsibility. Initiative, adaptability and quickness of perception are developed in the efficient miner.

We repeat that, as a class, miners rank high in our social economy.

It is, therefore, much to be deplored that the dishonesty and greed of a number of Cobalt miners has brought dishonor upon an entire community, and particularly upon the workmen of that community.

And it should at once be recognized as an imperative duty on the part of every honest miner that he do his utmost to bring to justice each and every culprit. A pronouncement to this effect from the representatives of the labor organizations would be timely. The stigma should and must be removed and the workmen themselves can act most efficaciously.

JOURNALISTIC AMENITIES.

The Sydney Record recently paid this "Journal" the compliment of reproducing from its correspondence columns some remarks on the question raised by the appointment of the Eight Hours Day Commission in Nova Scotia, and in doing so it prefaced the extract by stating that the Glace Bay cor-

respondent of "The Canadian Mining Journal" "reflects the views of the Dominion Coal Company." This statement has been made by the Record previously, and we wish to be allowed to correct any false impressions that may arise if we permit it to go unchallenged.

The Glace Bay correspondent of this "Journal" reflects the views of no person but himself. These letters are, however, written from Glace Bay. Everything that emanates from Glace Bay must of necessity bear the impress of Dominion Coal, and while to one person this may be synonomous with the mark of the Beast, yet to another person it may suggest nothing beyond the operations of a business machine on whose efficient operation the welfare of some 30,000 persons directly depends. Everybody in Glace Bay is either the servant of the Coal Company, or the servant of the servants of the Coal Company. Correspondence from Glace Bay to an organ of the mining industry must have an inevitable tinge, but apart from this we plead not guilty to the Record's impeachment.

A corporation is not an entity, but an aggregation of parts. It is a commercial machine, ingeniously assembled and designed for one purpose only, namely, that of earning dividends on the moneys entrusted to it by the shareholders. A corporation may have a policy, and usually has a very well defined one, but it cannot hold any views, for that is the privilege of the individual. We take it that if the Dominion Coal Company were anxious to impress upon the public the rectitude of their policy they would not seek to do so through the medium of an anonymous correspondent to a technical journal that is read largely by a class whose policy is at one with that of the Dominion Coal Company. They have other and more telling means of publicity, and while we cannot but feel flattered at the Record's evidently high opinion of our perspicacity in this matter, we must make it very clear that our views are uninspired and original. Whatever bias we have is purely personal.

PREPARATIONS.

Arrangements are now completed with the Commissioners of the Canadian National Exhibition, to be held in Toronto from August 29th to September 14th, whereby a day is to be set apart for the mining industry. Ample space has been allotted for mineral and metallurgical exhibits. The Provinces are to be asked to aid in making a strong and impressive display. Mining corporations are also expected to contribute towards the success of this praiseworthy plan.

Manufacturers of mining machinery and supplies are particularly requested to spare no effort to make a fine showing.

September 4th is the day selected as "Miners' Day." On this day the British and European delegates, visiting Canada under the auspices of the Canadian Mining Institute, are to be in Toronto. Their presence will lend additional importance to the event.

Dr. J. O. Orr, the secretary of the Exhibition Commission, whose office is in the City Hall, Toronto, will give all information on request.

DR. ROBERT BELL.

It is reported that Dr. Robert Bell, Chief Geologist of the Survey Department, will soon be granted leave of absence for a number of months, to be followed by superannuation at the maximum rate. Dr. Bell has seen many years of continuous service. He is still vigorous and energetic and will, no doubt, continue his excellent professional labors unofficially. "The Canadian Mining Journal" wishes to extend the hope that Dr. Bell's well-deserved release from the burden of routine will be a period of profit and pleasure to himself and to his friends.

MINING IN THE PROVINCE OF QUEBEC FOR YEAR 1907

Mr. Obalski's annual report contains the usual summary of mining operations. The calendar year 1907 is covered by the report. We have already given a detailed list of the production of minerals. The increase over 1906, as noted before, is $371,370. We shall now take up the more important branches of the industry in the order followed in the report.

Iron.

The Canada Iron Furnace Company at Radnor, and the John McDougall Company at Drummondville, using mostly bog ore, produced a total of 10,047 short tons of charcoal iron. There was no important work done on the other iron deposits of the province.

Masses of hematite, occurring irregularly in a strip of ferriginous dolomite, in Dunham Township, County of Missisquoi, were examined. Picked samples showed 69.49 per cent metallic iron.

Magnetic and titanic iron ore was found in the Seigniory of Rigaud Vaudreuil, Beace.

Referring to the magnetic sands of the north shore, Mr. Obalski claims that they can be profitably concentrated into a product yielding 67 to 70 per cent. metallic iron, about 1 per cent. titanium and practically no sulphur or phosphorus. The applicability of the Grondal process is pointed out.

In the neighborhood of Three Rivers and at St. Malo, ochre is mined and calcined by three operations, the Canadian Paint Company, the Champlain Oxide Company, and S. W. Argall. Calcined ochre is shipped to Canadian and United States consumers. Some crude ochre also is shipped. For 1907 the output of crude was 2,700 short tons, worth $5,400; of calcined, 2,300 tons, worth $29,530. The work continued only throughout a portion of the year. Sventy-five men were employed.

Chrome Iron Ore.

Three companies worked the chrome iron ore deposits in the Township of Colraine—the Black Lake Chrome & Asbestos Company, the American Chrome Company, and the Canadian Chrome Company. A total of 40 stamps and 12 Wilfley tables make up the mill equipment of these companies. Seventy-six men are employed during periods of from 4 to 11 months. The output for the year was 5,721 long tons of 1st and 2nd class ore and concentrates valued at $63,130. A considerable amount of diamond drilling is being carried on.

Copper.

The mines in the Capelton region were regularly worked by the Nichols Chemical Company, and the Eustis Mining Company.

At the latter's mine a depth of 2,800 feet has been reached. Electric power is supplied from a waterfall two miles from the mine on the Coaticook river. Concentration works capable of turning out 200 tons of concentrate per 24 hours are installed near the railway. The equipment consists of 4 Blake crushers, 3 double rolls, and 8 Wilfley tables. The ore body in sight is large and variable in grade.

At the Nichols Company's Albert mine work was continued in Shaft No. 1. Sulphuric, nitric and hydrochloric acids and glauber salts are manufactured at the company's chemical works.

Several small promising prospects are being developed by other parties. Prospecting is being actively followed near Sherbrooke.

In the copper industry 250 men were employed. Twenty-six thousand four hundred and five long tons of copper ore were mined, valued at $160,455.

Gold.

The excitement produced by the discovery of gold in the Gilbert river in 1863 led to no important results, although an estimate places the amount of gold taken out between 1863 and 1878 as $2,000,000. Operations were then confined to a strip two miles long. Mr. Obalski urges the systematc prospecting of the district.

Near the close of 1906 auriferous quartz was found in the Township of Marstin. Assays by Dr. Milton L. Hersey showed from traces up to $10 per ton of gold. This is the first discovery of gold in quartz in apparently commercial quantity.

Asbestos.

The asbestos industry continued to flourish during the past year. The utilization of short fibres in the manufacture of boards has encouraged the opening of new mines, especially in East Broughton. Most of the companies used electric power furnished by the Shawinigan Water Power Company and the St. Francis Water Power Company.

At Thetford the King asbestos mine, the Bell mine, the Johnson mine and the Beaver mine are working regularly. At Black Lake the American Asbestos Company has acquired the mines of the Montreal & Glasgow Asbestos Company and of the Manhattan Asbestos Company, and now operates four independent mines. Other companies are the Johnson Company and the Standard Asbestos Company.

In Broughton, Colraine and Wolfestown Townships there is activity in asbestos mining. The Asbestos & Asbestic Company continue to employ about 400 in their mine and mills. Their power is partly supplied by the Shawinigan Water & Power Company. Their old quarry is 200 feet deep and is served by 18 cable derricks.

Of 1st class (crude), 2nd class (crude), fibre and paper stock the province produced 61,85 tons valued at $2,455,919. Asbestic was produced to the amount of 29,193 tons worth $27,292. Men employed, 2,141. Wages paid, $931,061.

Amber Mica.

The amber mica industry prospered during the year. Shipments increased and prices were good, especially for small mica. But towards the end of the year the demand suddenly ceased and the Ottawa trimming establishments were temporarily closed.

The Blackburn Company, working the Perkins Mill, was the most important producer. They also shipped a couple of hundred tons of phosphate.

Production of province—

	Pounds	Value
Total thumb trimmed	542,290	$197,739
Split	7,957	2,109
Rough called mica, 150 short tons, ...		24,030

Employees.—288.

Wages.—$108,600.

No white mica was mined during 1907.

Phosphate.

As mentioned above, phosphate was mined with mica in the Ottawa region by the Blackburn Brothers. This firm shiped 200 tons of 80 per cent. and 60 tons of 60 per cent. The Capelton Chemical and Fertilizer Company of Buckingham, used 35 tons of phosphate, and the Electric Reduction Company of the same place used 300 tons.

The total value of the phosphate, 408 short tons, was $3,410. Both companies named above imported phosphate from Ontario and the United States.

Graphite.

Much prospecting was done in Buckingham, Grenville, and Labelle districts. In the Buckingham region the Diamond Graphite Company, an American company, worked lots 12, 13 and 14 of range X and erected a mill on the property. The dry process of concentration is followed.

The Bell mine, operating lots 1, 2, and 3 of range V, Buckingham, took out a fair amount of ore. A mill is being erected.

The Buckingham Graphite Company, with mines and mill on lot 19 B, of range VIII, of Buckingham, did not work during 1907. A quantity of the previous year's products was shipped. Brumell's process is used here.

These were the only operating companies in Buckingham.

In the district of Grenville, and in the townships of Amherst, and Joly, there was some work done.

From the province 120 short tons of prepared graphite were shipped, valued at $5,000.

Natural Gas.

The Canadian Gas and Oil Company, whose office is in Three Rivers, sank a number of wells near Louisville, Yamachiche, and St. Barnabé. In thirteen of these gas was encountered in merchantable quantities. Gas was generally struck at a depth of 225 to 300 feet. The

bore-holes passed through clay, fine sand, and gravel before striking solid rock and gas. The producing wells are cased and connected with a distributing line. Pipe lines are laid to supply St. Barnabé, Yamachiche, and Louisville, and a 8-inch pipe line, 13 miles long, is laid to Three Rivers. The city pressure is reduced to 4 ounces.

The gas is clean and non-sulphurous. The supply is limited and deeper boring will have to be done to find more lasting reservoirs.

The report concludes with a list of companies operating in Quebec. Appended are reports of explorations north of Pontiac and on the surveyed townships of Lake Temiscamingue.

MINING IN THE EASTERN TOWNSHIPS OF QUEBEC.

By Fritz Cirkel, Mining Engineer, Montreal.

Mining in the Eastern Townships of the Province of Quebec is destined to play an important part in the mineral history of the Dominion, judging from the efforts which have been made for quite a number of years to increase gradually the capacities of the established mines or to open up new mines and add facilities for handling the output.

Asbestos and chrome iron are at present the staple articles of production; but there are other ores such as those of iron, copper, and last but not least, gold, to which little attention has been paid, and it is to be hoped that before long, earnest efforts will be made to test and exploit these deposits.

Copper deposits occur in a number of localities through the counties of Megantic, Leeds and elsewhere, the only copper mines being the Eustis and Nichols mines at Capelton, while some work was also done last year at the Ascott, Suffield and King mines. About



The 500-ton plant of the Dominion Mines Asbestos Co. and the Asbestos Plant of the Standard Asbestos Co., at Black Lake, P.Q.

32,000 tons of ore were produced of which about 8,000 tons were treated at Capelton for sulphuric acid and matte by the Nichols Chemical Company, which according to Mr. Obalski produced 374 tons of matte containing as an average 53 per cent. copper.

Considerable excitement has been caused by the discovery of gold in the vicinity of Lake Megantic, and it is reported that practically the whole territory, especially to the east of the lake, has been staked. The gold is reported to occur in quartz veins which yield in some cases satisfactory returns when assayed. However, no mining to speak of has been done, and it remains to be seen whether the mode of occurrence warrants the exploitation of the deposits on a large scale.

The asbestos industry forges ahead as usual, and, while it must be admitted that the recent financial depression has had its effect upon this market for some months past and has delayed the proper development of several new enterprises, still the outlook is most encouraging. Especially is this the case as regards the sale of fibre used in asbestos roofing slate, and asbestos board, an invention of importance in the construction of fireproof buildings. All the mines, some of which had closed down during the winter as usual, commence to gather in their full quota of men in order to resume operations. Mine labor, which at this time a year ago was scarce, seems to be plentiful, and there is now no difficulty of manning the mines and mills to their full capacity. In addition to the established mines at Thetford and Black-Lake, quite a number of new mines are opened up, especially in the East-Broughton district. This region has attracted considerable attention for some time past on account of the excellent fibre the mines produce. Careful exploration work carried on for the last two years has demonstrated that the productive serpentine belt has a far greater extent than at first supposed. The belt has not only been traced from Range 3 at East-Broughton up to Range 11 at Broughton, a total length of approximately 7 miles. but in almost every range work has been done to prove the productive character of the rock. Strange to say the serpentine occupies all lots, more or less, numbered "13" and the sinuosities of the boundaries of this belt with only one exception keep within the southern and northern limits of these lots. The following table will show the succession of outcrops and mines along the belt:

Lot 13, range 4; the Millar outcrops.
Lot 13, W.range 5; the Boston Asbestos Company, (mill under construction).
Lot 13, E. range 6; The Frontenac Asbestos Mining Company, (mill under construction).
Lot 13, W. range 6; The Quebec Asbestos Company, (in operation).
Lot 13, W.W. range 6; The Eastern Townships Asbestos Company, (in operation).
Lot 13, E. range 7; The Broughton Asbestos Fibre Company, (in operation).
Lot 13, W. range 7; The Tanguay Outcrops.
Lot 14, range 7; The Fraser mine, (not in operation).
Lot 13, range 8; The Taschereau and Bolduc Asbestos outcrops.
Lot 13, range 9; Outcrops of fibrous serpentine discovered.
Lot 13, range 10; Outcrops of fibrous serpentine discovered.

The "Boston Asbestos Company" operating on Lot 13, W. range 5, is at present constructing a mill for the treatment of about 250 tons of asbestos rock; this mill will be ready about the first of August; steam power

will be used, but it is the intention to replace this by electric power, if reasonable terms can be obtained from the electric power companies that intend to enter the field. The mill building is located at a distance of 500 feet from the asbestos outcrops, close to the track of the Quebec Central Railway; its size is 50 x 150; it will contain two cyclones and all modern appliances for the extraction of the asbestos fibre. Mr. A. A. Nor-



The new 500-ton Asbestos Separation Plant of the Dominion Mines Asbestos Co. at Black Lake, P.Q.

mandin of Boston is the general manager of this company. The area of the property is 85 acres.

Adjacent to the "Boston Asbestos Company's" property to the west, the "Frontenac Asbestos Mining Company," which controls an area of over 100 acres, is building a mill of a capacity of 300 tons ped day. The outcrops of fibrous serpentine, which are scattered all over the northwestern part of this property, apparently indicate that the productive fibrous serpentine covers a larger area than was originally supposed. Mr. H. Riehle, formerly of the "Union Asbestos Company," is the designer of the mill and is the manager of the company.

The "Quebec Asbestos Company" operating to the west of the "Frontenac," have been working during the winter with about 40 men, and are putting on a larger force of men with the advent of the summer season.

The "Eastern Townships Asbestos Company," which commenced to operate this mill last fall, has just been starting up again, after a shut down of about three months, due to repairs and alterations in the mill. The latter has been built during the summer season of 1907, inside six months, a rare accomplishment indeed considering the difficulties in transportation in that part of the country. Mr. P. Angers, N. P. of Quebec, is the energetic manager of this promising concern.

The "Broughton Asbestos Fibre Company" on lot 13, E. range 7, commenced operations in mine and mill in the middle of April, after a shut-down for about four months. This company, which was the first one in the district to prove the value of these peculiar ore deposits, have been operating their new mill during last year with great success; about 300 tons of rock were handled in the mill per day, producing approximately a carload or as an average about 25 tons of asbestos fibre per day. It may be said here that the success of this undertaking which at first had to surmount a great many difficulties, in in a large measure due to the untiring efforts of Co.. Williams, the manager of the concern.

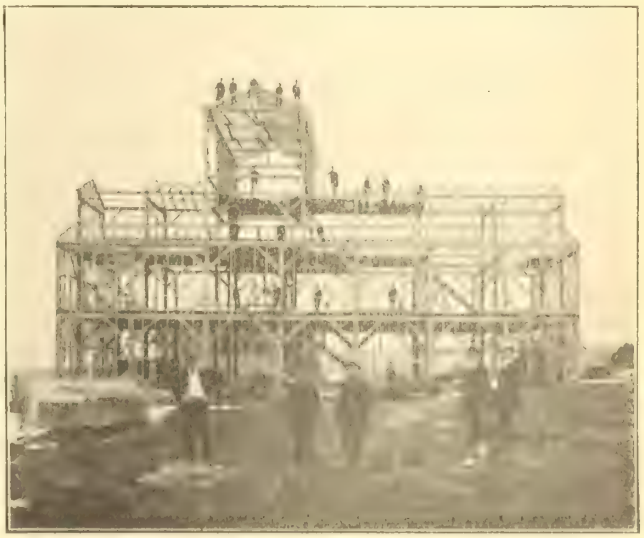
Further to the northwest from these properties, excellent outcrops can be noticed on the "Tanguay," and further west again on the "Taschereau" lot. Plans of a mill for this latter promising property for the treatment of about 300 tons of rock per day are being made, and all preparations are under way to begin work as soon as the snow disappears.

At Black Lake, the big 500-ton mill of the "Dominion Asbestos Company," is almost completed, and it is expected that this company will soon bring its products, which on account of some innovations in the mill system, are said to be of superior quality, on the market. The Greenshields asbestos property, forming part of the holdings of the "Black Lake Chrome & Asbestos Company" has been sold recently to Quebec parties, and a mill is to be constructed during the course of next summer.

The Johnson Asbestos Company, the pioneer company of the district, commenced operations in 1878. Its new 500 ton mill is now almost completed. Four mills are now run by the same company.

If all the mines and mills are built and developed as contemplated at present, there will be in the beginning of 1909 altogether 7 new establishments in operation, which will add to the present mill capacity of the district approximately 2,000 tons of asbestos mill rock per day, which at an extraction of 8 p.c., would yield an additional output of asbestos of about 180 tons. The total output of the districts for 1907, according to the statistics furnished by the "Mines Branch," amounted to 62,000 tons of a value of $2,482,984.

In the chrome iron industry the output will be considerably increased in the near future, owing to the completion of the new inclined shaft No. 1, of the "Black Lake Chrome & Asbestos Company." Large bodies of crude ore have been tapped through this new shaft, which has a depth of 320 feet, delivering from 30 to 40 tons daily of high class ore, beside a good deal of milling material. From present signs it appears that



New Mill of the Boston Asbestos Co. at East Broughton.

in this industry, great activity will be displayed during the coming summer season, as the inclemency of the weather during the past winter has had the effect of reducing the regular production. There are three operating companies in the field with a milling strength of 75 stamps. The production for 1907 amounted to 7,196 tons valued at $72,901.

REPORT OF THE FRENCH STATE COMMISSION ON THE COURRIERES EXPLOSION OF THE 10TH MARCH, 1906.

(Translated from the German: "Gluckauf," 15th February, 1908.)

The following report of the Commission appointed to enquire into the Courrieres explosion has been published by the Minister of Mines:—

The cause of the initial explosion which produced the main catastrophe has not been clearly ascertained, in spite of continuous and exact researches. It has been shown, however, that its wide extension over the whole of the underground workings of pits Nos. 2, 3 and 4-11, an area of three kilometres by one and one half kilometres, was due to a coal dust explosion, produced by a combination of circumstances.

Everything points to the origin of the first explosion in the Lecoeuvre Heading, but this cannot be stated with any greater certainty than the cause of its origin. Whether it was due to a sudden outbreak of gas, or to an explosion of powder, or to whatever cause, can only be surmised.

Under these circumstances no real connection has been found for which the coal company could be held responsible between the explosion and the use of open lights in the Lecoeuvre Heading, nor of the explosive Favier I, in the place of the prescribed "safety" explosive.

Also it is evinced by all signs that the fire in the Cecile seam had nothing whatever to do with the disaster. The importance of this fire has been extraordinarily overrated. All necessary measures for fighting this fire had been taken by the company, and there was no necessity to prohibit the descent of the workmen.

In this matter no particular blame attaches to anyone.

Several circumstances may have helped to make the catastrophe a severe one, in particular the underground connection between Nos. 2, 3 and 4-11 shafts, and the imperfection of the ventilation through an irregular splitting of the air and the failure of the ventilation doors in the main roads.

The great extent of the explosion was only rendered possible by the communication that existed between the three shafts.

The number of men who died by suffocation would doubtless have been lessened if the air current had been stronger and the ventilation so arranged that it would have restored itself after the explosion and carried off the deadly gases. Instead of this, the ventilating current was completely disordered by the destruction of the numerous trapdoors and the ventilating partition in shaft No. 3. But these fatal errors were not disclosed until the explosion drew attention to them.

As the workings at Courrieres were free from gas, it seemed unnecessary to divide the mine into limited districts or to regulate the ventilation, and in general, the communication between the various shafts appeared to be justified on the ground of safety, especially as affording a way of escape to those employed underground in the case of an inrush of water.

Referring to the coal dust danger, it had not been previously supposed that a coal dust explosion of such magnitude was possible. The only cases of coal dust explosion that have taken place previously in France have not extended for a greater distance than 80 to 100 metres; with the exception of the Decize explosion, which extended over 180 metres.

However deficient the layout of the mine may appear to-day in the light of experience, yet before the explosion the need for improvement did not appear. The decision of the authorities that the circumstances did not call for a prosecution is based on an appreciation of this fact.

The disaster of Courrieres has shown unmistakably, however, that under conditions which are not yet fully understood a non-gassy mine where coal dust is present may present the same dangers as a fiery mine.

Therefore we think it is necessary from now on to extend to all coal mines the regulations for safety that govern fiery mines at the present time. Where the dust is of such a nature that it will not readily explode and the danger is thereby minimised, these regulations may be modified.

Regarding the general layout of collieries in the future, we think more regard must be had to the effective separation of the several shafts of a single colliery, with an isolation of the districts of the mine and their ventilating currents, and a limitation of their extent in order to minimize as far as possible the effects of an explosion by confining it to the smallest possible area. In accordance with the Report of the Commission on Mine Gases in November, 1906, this separation should be effected by means of iron doors, which will open outwards only, and will withstand a pressure of up to five kilograms per square centimetre, and which can be closed from either side. Finally, more attention must be devoted to a methodical system of splitting the air current to assure that every point shall receive its quota of the ventilation.

In the future ventilation partitions shall be avoided, and the exhaustion of the seam shall not be forced unless it is accompanied by the presence of sufficient material to pack the goaf.

The use of open lights is forbidden in all the mines, and only permitted explosives with approved ignition apparatus are to be allowed.

The whole of these measures are to be effective in the coal mines of the Nord and Pas de Calais Basins. Steps will be taken to put them into effect in every coal mine in France.

The provision of breathing apparatus for rescue work is prescribed by the order of 15th April, 1907. The outstanding questions therefore are the dangers of coal dust explosions and the necessary safeguards to be adopted, together with the question of the use of so called safety explosives in fiery or dusty mines.

It was demonstrated by the recent explosion in the Saar district (Prussia) and also at Courrieres itself that appreciably long portions of roadway will, if sufficiently damp, tend to hinder the spread of an explosion. It is not, however, certain that the dampness produced by sprinkling will always serve to prevent the extension of an explosion.

It has further been shown that the operation of sprinkling at short intervals is more or less useless, for the reason that the evaporation set up by the air current will nullify the effect of the sprinkling in from two to three hours.

On the other hand, it has been proved at Courrieres, and especially in the thin seams, that where the system of working tends to bring down a certain amount of

roof shale and stone, and that where the mine dust consisted of an admixture of shale and coal dust, the explosion was not carried along. It would therefore suggest itself that an admixture of shale dust with coal dust or with some inert material may lessen the danger of explosion.

Before, however, any compulsory measures of this nature are promulgated, such as the sprinkling of more or less extensive roadawys, the utility of which is not yet placed beyond doubt, and which certainly is accompanied by difficulties and numerous disadvantages, it appears very necessary to give these questions a searching investigation.

Great care is needed in the matter of so called "safety" explosives, not only as regards the strength of the charge, but also with reference to the composition of the explosive itself, on which at the present time there are two directly opposite opinions. One view is that the resultant fumes of a detonated explosive should contain no combustible gases in order that they shall not pollute the atmosphere, nor increase its proportion of dangerous constituents. The other view is that an explosive should contain none of those gases that will aid combustion, as oxygen for example, as these gases by increasing the temperature of detonation, increase the danger of exploding a mixture of gas and coal dust.

It is therefore necessary to establish by an investigation what are the safest and at the same time the most useful explosives.

As the other recommendations are already or shortly will be the subject of new regulations, we consider that the Commission on Mine Cases, who have already studied the dangers of coal dust and the question of explosives, should be directed to undertake the work of investigation, to conduct the necessary experiments, and to publish their findings, not only as refers to sprnikling, but also in relation to the general recommendations that have preceded. Further, we recommend that as soon as possible they issue their report on the work they have already done in connection with explosives; but regulations governing the size of charges and the strength of explosives now in use, shall at once put into effect without waiting for the recommendations of this Commission.

As publications relating to the Courrieres explosion have appeared in other countries, and as many lessons are to be learned from the circumstances of the explosion, a descriptive account of this shall be printed in the Mines Annals. This work will be undertaken by Engineer Heurteau.

The final investigations into the fire in the Cecile Seam have established the fact that it was a fire of but small proportions that attacked the mine timber and destroyed about 2,000 kg. of timber. This fire was not for any length of time so important and disturbing as the signs it gave off in the commencement of the rescue work, seemed to indicate.

These evidences strongly influenced all the measures taken as they appeared to threaten an immediate danger, which, as a matter of fact, was not so important as it looked.

The overrated importance of these evidences of fire lamentably hindered the work of rescue.

The exploration work in No. 3 pit, for the temporary cessation of which the engineers who had charge of the work of rescue, have been blamed, occupied afterwards no less than 37 days, and this with much better materials and under more favorable circumstances than presented themselves at first.

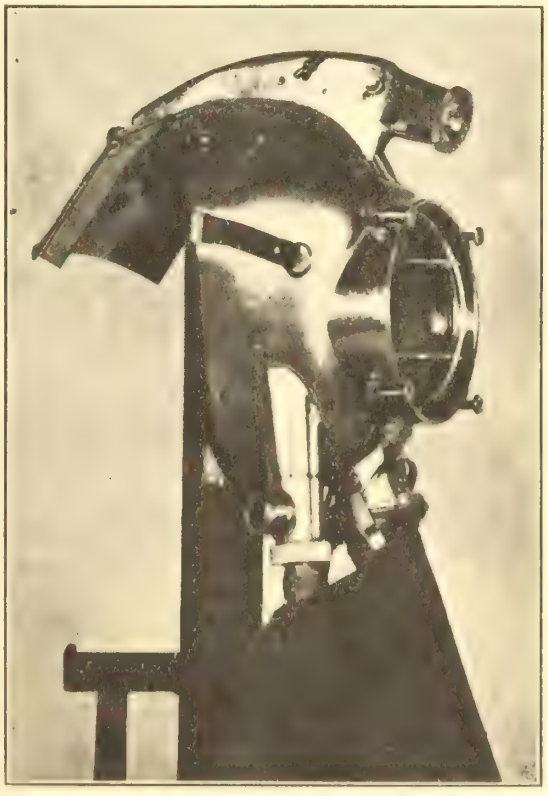
The restoration of the ventilation and the starting of the No. 4 pit fan, which were at that time so severely critized, are alone to be thanked for the steady improvement of the air to the south of shaft No. 3, as after events proved conclusively. It was through this that the thirty survivors were enabled to leave their place of refuge and reach the bottom of No. 2 shaft without being overcome by the after damp.

From the findings of the Special Commission held by Chief Engineer Carnot, it came out in the enquiry, that the stoppage of the exploration work in No. 3 pit and the restoration of the ventilation were justified by the results. In particular, it was due to the restoration of the air current that the thirty survivors escaped from what would otherwise have been certain death.

F. W. G.

THE DRAEGAR HELMET.

The above is a photograph of a Draeger helmet fitted with an electric lamp. The arrangement will leave free the hands of the man wearing the helmet for other work. The battery forms a flap at the back of the head, and the whole arrangement appears very compact. We do not yet know what the weight of the lamp and battery is. This is an important consideration, for any marked weight on the head would soon



become irksome. The Draeger people are also making helmets fitted with a device that will enable the wearer to speak to another man wearing a helmet or to persons outside the zone of unbreathable gases in which the wearer is working. In the latter case the rescuer will lay a thin telephone wire behind him as he advances, similar to the field telephones that were used by the Japanese in the late war. These additions are small but they all tell in the general efficiency of rescue work.

A RECENT DISCOVERY OF GOLD NEAR LAKE MEGANTIC, QUEBEC.

(Printed by permission of the Acting Director of the Geological Survey.)

Abstract of report by John A. Dresser.

A discovery of gold, which has recently attracted much attention in this district, has been made in the township of Marsboro, in the south-eastern part of the county of Compton, a few miles from the village of Lake Megantic. Lake Megantic station, on the Canadian Pacific Railway, between Montreal and St. John, is 175 miles from the former, and 307 from the latter place. It is also connected with Quebec city by the Intercolonial Railway, the distance being 115 miles. The place where the gold has been found is in the fifth range of Marsboro, principally upon lot nineteen. The distance from Lake Megantic station by road is about nine miles, but this can be shortened to less than six at seasons of the year when the lake can be crossed by boats, or sleighs.

The District.

Victoria bay, on the west side of Lake Megantic, and three miles from its northern end, is the most prominent irregular feature in its shore-line. The head of this bay is within a mile and a half of the gold locations. Victoria river, which empties into Victoria bay, is a stream some fifteen miles in length, and has several tributaries, the largest of which takes its head near Big Megantic mountain. Along the Victoria river a considerable number of prospecting licences have been lately taken out, the licence holders evidently considering that the discovery of gold in the rock of the neighboring hills is a favorable indication of the occurrence of placer deposits in the valleys.

Geology.

The areal geology of this district has been discussed by Dr. R. W. Ells, of the Geological Survey, in the annual report for 1886. The map accompanying that report shows the district to the northwest of Victoria bay—including the locality of the recently discovered gold and the valley of the Victoria river—to be occupied by sedimentary schists, and slates of Cambro-Silurian. They are dark or iron grey, fine grained sediments, with a good slaty cleavage. As their color would indicate, they contain small amounts of iron ore, and are somewhat micaceous. They give a rather even surface to the country, which in this vicinity is broken only by the prominent intrusion of Big Megantic mountain. So far as known, this is wholly a mass of granite. It rises abruptly above the surrounding country for 1,500 or 2,000 feet, and occupies between twenty or thirty square miles.

The area between the south end of Lake Megantic and the International Boundary Line, except for some granite hills, is occupied by rocks of a much earlier age; being a part of the Pre-Cambrian formation brought up from the folding of the White mountains. Large portions of it are known to consist of diabase and other basic eruptives. The intervening section is mapped as Cambrian. It is largely drift covered in the district in question.

The boundaries of the formations, and the strike of the rocks, are northeast and southwest: that is, parallel with the axes of the mountains on the southeast.

The surface of the entire district is generally covered by drift, which carries a large number of boulders—chiefly granite. Exposures of bed rock are few, and of small extent. Yet, the soil is not usually deep, and seems very evenly distributed.

Occurrence of the Gold.

At the time of the writer's visit, in April, 1908, no work had been done for several months, and the pits and trenches were filled with ice and water. Hence, samples showing a proper average of the fresh rock could not be obtained. The ground, however, was practically free from snow, and there was favorable opportunity for tracing out the relations and partial extent of the gold-bearing rock.

The rock which carries the gold in Marsboro is a fine grained granite, slightly porphyritic in structure, and it occurs in the form of dikes in the Cambro-Silurian slates. Three separate dikes were located. They were between fifteen and thirty feet wide—as far as could be ascertained—and all seem to be about vertical in position. One of them was traced by occasional exposures, for 600 yards. They have been much shattered and broken, and in places are quite schistose. In the cracks thus formed there are many small reticulating veins of quartz in some of which visible gold occurs. These veins are usually less than an eighth of an inch wide; although one, two inches in width was seen. The granite of the dikes consists of quartz, and feldspar, with a little muscovite, and in places contains grains of dolomite. Grains of chalcopyrite are frequently found in some parts of the dikes, and a little pyrite and galena are also to be ssen. The sulphides are, however, not limited in their occurrence to the little veins, as seems to be the case with the visible gold. The rock is often thickly spotted by iron rust; indicating that iron bearing sulphides were originally disseminated throughout much of the dike. No gold has yet been found in the slates on either side of the dikes.

In direction, the three dikes are practically parellel. Dike No. 1, on lot nineteen strikes N. 60 degrees W.; dike No. 2, which occurs on lot twenty and twenty-one, N. 55 degrees W; and dike No. 3, on lot twenty-one, strikes N. 60 degrees W. The direction of the cleavage of the slates in the few places where it could be seen, was found to coincide nearly, if not quite, with the dikes.

On dike No. 1, there are four exposures:

(A). A cutting about three feet deep has been made, exposing this rock at the edge of the woods which cover the western half of lot nineteen. Gold is reported to occur here.

(B). Two hundred feet northeast from A, a shaft has been sunk to a depth of twelve or fourteen feet. Visible gold can be occasionally seen in the rock of the wall, and of the dump. The shaft was largely filled with ice and water at the time of my visit. This is the place where the original discovery was made and Mr Obalski's specimen was taken from this pit.

(C). A hundred feet northeast from B, is a cutting three feet deep, from which visible gold is reported

A specimen taken from this place, showing no visible gold, and carrying a few grains of chalcopyrite, was assayed for mee by Mr. H. F. Strangways, M. Sc., at McGill University. The results obtained were:

Gold,	0.35 ounces at $20.00 equals ..	$7.00
Silver,	0.70 ounces at $0.60 equals ..	0.42
	..	$7.42

A. B. and C. are on lot nineteen and the width of the dike, as shown at these places, is between fifteen and twenty feet.

(D). Five hundred yards northeast from C, on the farm of Donald Smith, lot twenty, range four, the rock has been uncovered. This discovery disclosed the regularity in direction of this dike. There is no exposure of the rock between C and D; but it was found at the latter point by Mr. Smith, by carrying a line in the direction indicated by pits B and C, until his property was reached. Then, sinking through some eight feet of drift, he found the dike rock which is reported to carry gold.

A, B, and C are on the lands under lease to J. A. McIver and associates. The mining rights at pit D, are owned by Donald Smith.

On dike No. 2, no work has been done, and there are only two natural exposures some forty yards apart. The dike appears on lot twenty, a few feet from lot twenty-one, and running obliquely towards the boundary line. It probably enters that lot near the more northerly of the two exposures seen. Slate was found on both sides of it, but at some distance. This dike is not less than ten, nor probably more than thirty feet in width. It is 500 yards northwest from dike No. 1.

The mining rights on lot twenty are heid by Mr. McIver et al, and those on lot twenty-one, by Messrs. Gendreau.

On dike No. 3, which is forty yards northwest from No. 2, and thus is on lot twenty-one, a cutting apparently seven or eight feet deep has been made. The southeast wall is slate, that on the northwest has not been found. Mr. A. B. Gendreau, Lake Megantic, one of the owners, reports that the rock at this place yields a trace of gold.

Source of the Gold.

The gold has evidently been brought in by the granite of the dikes in which it is now found; since it iccurs in the rock as well as in the small veins. The subsequent shattering of the dikes by regional metamorphism, has afforded conditions for the concentration of the gold in the small veins in which visible amounts have been found.

Extent of the Gold-Bearing Rocks.

Thus far only three dikes have been found in this vicinity. But as little or no stripping has been done in search of them, since the natural exposures of bed rock are exceedingly few, and as the dikes yet found are near together, it seems likely that there are many others in the vicinity. Their number depends in a considerable measure upon the source of the dikes. Dikes are off-shoots from larger masses of related rocks which have filled cracks and crevices formed by the intrusion of the larger bodies. These dikes all trend directly towards Big Megantic mountain, some seven miles distant. This is an intrusive mass which has been thrust up through the surrounding slates, and, as far as known, is of granite, having a chemical, and mineralogical composition that could give rise to such dikes.

Alluvial Gold.

Following the announcement of the discovery of gold in the rock at Marsboro, a considerable number of licences have been taken up along the Victoria river. These appear to be held chiefly by placer miners from Beauce. It was late in the season when most of the licences were obtained and no work of importance has yet been done. With the lowering of the water in the early summer, the valley of the Victoria will probably b well prospected. At the time of writing no evidence of the value of these prospects is available.

Prospecting of the District.

It must be borne in mindthat the gold bearing rock at Marsboro is as yet known only in small amount, and that the proven occurrences of gold are few. While samples have been taken which appear to represent the general rock of the dikes, and hav been found to carry gold, they are after all only random specimens. Samples representative of each dike must be taken at many points before the commercial value can b distinctly asserted. At present there is no place exposed suitably, for the taking of such samples. The dikes are definite bodies, and can be easily uncovered by stripping, and fresh rock could be obtained at a few feet from the surface. Continuous specimens taken across the dikes at suitable intervals would soon make it easily apparent what the possibilities are for profitable mining.

The country is easy of access, and prospecting is not unduly expensive. Once recognizing the direction of the dikes, it is a comparatively simple matter to follow them, as was shown by the discovery of pit D, on dike No. 1, by Donald Smith. If the gold proves to be persistent and at all uniformly distributed in the rock, the district would admit of mining under favorable conditions. Labor in not highly expensive, timber is plentiful, water supply can be had at no great distance, and transportation difficulties are not excessive.

But first, the actual average values of the dike over long distances must be ascertained, and the mode of occurrence of the gold—whether evenly disseminated or unevenly distributed through various parts of the rock—must be found out. And these facts must be determined for each individual dike. Then, if these already found yield values to warrant it, the search for others should be made as already indicated.

Licences.

Prospecting licences.giving an exclusive right to examine the property, with the privilege of securing mining licences or of buying mining rights in the Province of Quebec, may be obtained from the Hon. the Minister of Mines, Quebec. These licences are granted for three months, and are renewable at the discretion of the Minister. The licence fee in surveyed private lands as at Marsboro, is $2.00 per 100 acres, or fraction thereof; a similar fee being required with each renewal. On November 24, 1907, the following lots were held under prospecting licences in the township of Marsboro:

Range 1, lots 17, 18; range 2, lot 19; range 3, lots 18-22 inclusive; range 4, 18-22 inclusive and 28; range 5, lots 16-22 inclusive; range 6, lots 13-20 inclusive; range 7, lots 12-21 inclusive; range 8, lots 10-14 inclusive; range 9, lots 7-14 inclusive; range 10, lots 7-14 inclusive; range 11, lots 4-11 inclusive and lot 4; range 12 lots 6-10 inclusive.

MINERAL LOCATIONS ON MORESBY ISLAND—ONE OF THE QUEEN CHARLOTTE ISLANDS.

(Abstract of Bulletin No. 1, issued by the British Columbia Bureau of Mines.)

(*Continued from last issue.*)

To the north of the tunnel, and on the Cash Box mineral claim in the cliff, there is, over a length of 100 feet, an exposure of magnetite carrying a considerable percentage of sulphides, chiefly pyrrhotite with some chalcopyrite.

Harriet Harbor.

Harriet Harbor lies to the west of Ikeda Bay and to the east of Huston Inlet, and is separated from each by mountains which run out into the sea in narrow arms, not over a mile wide at the head of the harbor, but two or three miles long.

The townsite of Jedway, with a wharf, store, post office, and several cabins, has been located on the southwest end of Harriet Harbor, and here the office of the Deputy Mining Recorder of the district is situated. It was on the shores of this bay that the first of the more recent mineral discoveries of the district were staked, by Watson and Thompson, in 1905. These discoveries may be considered the origin of the present activity in Moresby Island.

Copper Queen.—Probably the best known claim on this harbor is the Copper Queen, now held under bond by J. S. McMillan, of Seattle. The claim is situated on the southwest side of Harriet Harbor, some 5,000 feet from the water and 880 feet above it. On this claim, as on most of the claims in the district, the mineralisation consists of magnetite carrying variable amounts of copper pyrites, and upon the percentage of this latter mineral found depends the value of the deposits. When visited, the only development work done consisted of a large open pit in a small draw, made to expose and develop an exposure of magnetite found in a bluff on one side of the "draw." The work had succeeded in exposing a very considerable body of magnetite in a country rock, which appeared to be a much altered diabase. In the side of the cut there was exposed, dipping at an angle of 48 degrees, a body of magnetite 6 feet thick, of which the lower 4 feet 6 inches was almost solid magnetite, containing irregularly distributed bunches and stringers of copper pyrites. The upper 1 foot 6 inches of the ore body, although chiefly magnetite, was more mixed with rock matter and appeared to the eye to carry a lower percentage of copper. This face stood exposed for a height along its slope of 25 feet, with indications that it continued down under the dump and into the hill for some farther distance; at its highest point the ore body came out practically to the surface. An average sample of the exposed face of the ore body was carefully chipped off across the whole six feet exposed and at different places in its length; this sample assayed, copper, 1.4 per cent., with traces of gold and silver. Some 50 to 75 tons of mineral was piled up on the dump, and this also was roughly sampled, giving about 1.5 per cent. copper.

Some little distance up the creek from the open cut, and also about 300 feet to the east, are bodies of limestone, although none show in contact with the ore body.

Iron Mountain.—The Iron Mountain is another claim in the immediate vicinity, held by J. S. McMillan. On this but little actual development has been done, but stripping has exposed a similar body of magnetite of considerable size, showing copper pyrites along its margin.

Moresby Island.—The Moresby Island mineral claim lies somewhat to the south of the Copper Queen and is also held by J. S. McMillan. This claim overlaps to a considerable extent the Tate mineral claim, owned by T. J. Watson, as to the merits of which dispute no opinion is expressed. The first open cut seen showed a country rock consisting of a decomposed diabase or diorite, with a considerable quantity of secondary red garnets, in crystalline form, all showing copper stain and a small percentage of copper.

In the second open cut, near where a fine grained igneous dyke, of later origin, cuts through the country rock, there is a strong impregnation of iron pyrites and nearby a small seam of copper pyrites, while a certain amount of copper carbonate occurs in the rock matter, but no considerable body of ore has been exposed. A sample was taken of the exposed face of the cut, which gave, upon assay, copper, 2.7 per cent., wet assay, with traces of gold and silver. The face of the cut is about 10 feet long and 10 feet high, and was in at the bottom only 6 to 8 feet.

Reco.—The Reco mineral claim, held by J. S. McMillan, is located nearer the bottom of the hill, only 200 feet above and a quarter of a mile from the water. The country rock here is a much altered diabase, in which a deposit of magnetic iron, about three feet thick, is seen dipping into the hill at an angle of about 40 degrees, accompanied by a black hornblendic dyke and overlaid by a close grained silicious rock. The magnetite carries sulphides of iron and copper, the copper contents in the exposed face of the magnetite being estimated at from ¾ to 1 per cent copper. The exposure was visible for some 50 feet up the bed of the creek and was fairly uniform in character.

An inclined shaft had been sunk on the deposit and 3 sets of timbering, 5 feet apart, set up, below which the shaft is reported to have been sunk about 6 feet, but as it was full of water it could not be examined. A 16 h. p. boiler and a steam drill were on the ground, covered by a rough board shed. This boiler had formerly been used in prospecting the claims farther up the hill.

Huston Inlet.

Huston Inlet lies immediately to the west of Harriet Harbor and is a fine bady of navigable water. Some little prospecting has been done on its eastern shore, on the range of hills which separates it from Harriet Harbor, but the locality must as yet be considered as unexplored. The few recorded claims are quite unprospected and undeveloped, only a little surface scratching having been attempted.

Burnaby and Copper Islands.

Red Haven.—The Red Haven mineral claim on the south side of Copper Island, a claim recently re-staked by Abe Johnson and so named by him, is of interest as having been on the spot upon which Francis Poole and his party did their work in 1862-3, and where, about

five years ago, a prospector named Abe Heino, having re-located the property, did considerable work, the remains of which are still visible and excite in visitors much curiosity as to "what he was driving at."

Geologically, the island is similar to that portion of Moresby Island immediately to the south, and some two or three miles distant. The sedimentary rocks are so cut up by later volcanic rocks as to give the appearance of the limestones being the intrusions and the volcanics the country rocks.

In a little cove running into the island some 30 to 40 feet, with nearly perpendicular walls and a rocky floor, submerged at high tide, a tunnel was driven from the level of the rock floor for a distance of 35 feet, and from this tunnel a cross-cut had been started off to the right, towards the water, for some 10 feet. The work had been done along a limestone diabase contact, along which was visible a little magnetite carrying some copper pyrites, but in no place was the mineralization sufficient to be of any importance. The present owner has done no work on the property. The property is interesting, as showing what Poole spent two years upon, while so many much more promising showings were "sticking out of the ground" within three of four miles, on the larger island.

Sea King.—The Sea King mineral claim is a recent staking on the southwest side of Burnaby Island, by Captain Locke, of steamship "Princess Beatrice." On the beach, between high and low water, there is exposed a contact of limestone and fine grained trap, along which stands, exposed by action of the waters, a contact deposit of magnetite, from two to three feet wide, dipping at an angle of 80 degrees to the west. The magnetite carries some iron pyrites and a small percentage of copper pyrites.

In a small gulch, a short distance to the west, there is a light gray colored igneous dyke, fairly crystalline, and showing some horneblende, having a width of four or five feet, containing some stringers of calcite and also some magnetite and copper pyrites. Some little surface stripping had recently been done, with an idea of tracing out the contact, which was found to contain some copper pyrites.

Klunkwoi Bay.

On Saturday, August 31st, thanks to the courtesy of Mr. Ikeda, of the Ikeda Bay mines, the writer was loaned a gasoline motor boat with two men, and a start was made for a group of claims situated on Klunkwoi Bay, at the north end of Darwin sound, and inside of Lyell Island. The passages inside of Burnaby and Lyell Islands were taken, as being more protected from wind and sea. This inside passage is at all seasons suitable for a small boat, although the channel inside Burnaby Island is only a fathom deep at low water and is most tortuous and difficult to follow. The distance from Ikeda Bay to Klunkwoi Bay is about 45 miles, and the run was made in less than eight hours.

Swede Group.—None of the claims in this section of the island has been long staked, the first being the Swede group, staked in January, 1907, by Larsen, Pearson and Rogers. The group consists of eight claims, the Excelsior, Pearson, Larsen, Keystone, Bob, Anaconda, Seattle and Homestake mineral claims. The claims are so located as to cover a small peninsula projecting into Klunkwoi Bay and separating two smaller bays or fiords. This peninsula is not over 2,500 feet across and rises to a height above the water of about 1,000 feet, the average slope of the hillside being about 46 degrees, and this steep slope continues under the sea level, giving deep water at which any vessel can lie almost along the shore line. Although the claims had only been located for about six months, it was found that the owners had done a very considerable amount of development work which, as far as it had progressed, proved more than encouraging. The work consisted of a number of open cuts running horizontally along the hillside at intervals from the sea level to a height of 700 feet above. These cuts are on the Larsen claim, and may be said to have prospected a strip of hillside about 250 feet wide extending from the shore up to an elevation of 700 feet. The line of these cuts continued over the hill on to the south slope, has been further prospected on the Anaconda claim, and found there to be similar in all respects; therefore, it is to be presumed that the mineralized zone is continuous over the peninsula along the line prospected in a N. 63 degrees E. direction.

A short distance to the west of the workings a fault plane has cut across the peninsula, the line of its break showing clearly on the mountain side. To the west of this break the prospectors claim not to have found mineral, but it is suspected their investigation has not been thorough, as the geological conditions are the same on either side of the break, and it has not been a channel of infiltration of mineral. The country rock right across the peninsula appears to be uniform and the same, a much altered diabase,[1] cut by a few later trap dykes, which, however, do not appear to have any effect upon the mineralization.

As far as disclosed in the cuts, the 4 or 6 feet of rock lying next the surface contain very little mineral, but when this depth is reached the rock is found to become impregnated with copper pyrites and occasionally bornite, and this impregnation in the deeper cuts appears to be growing greater with the depth as far as the work had proceeded; this is, at the greatest, a depth of some 15 feet. Sometimes the chalcopyrite occurs in little granules, peppered all through the rock, and again it occurs in little veinlets, constituting an ore difficult to estimate the copper contents of by the eye.

Samples were taken from the most extensive of the open cuts, viz., the one at an elevation of about 75 feet above the sea level; of these a general sample gadded off the face over a distance of 75 feet horizontally, and for the height of the cut, except the upper "barren" six feet, gave upon assay better than 2 per cent. copper, with traces of gold and silver.

Another sample, taken by the writer, and which was intended to represent ore as it would be roughly handpicked, gave copper 5.7 per cent., silver 0.2 ounces to ton and trace of gold.

A third sample, taken from the south slope of the peninsula from an open cut on the Anaconda claim, gave 2.9 per cent. copper, with traces of silver and gold.

The occurrence of the mineral is such as to render hopeless any form of water concentration, and the ore would have to be smelted direct, but for such treatment it is admirably suited, as the gangue matter is self-fluxing and very easily melted.

To summarize the situation, the claims have not as yet been developed sufficiently to absolutely prove their ultimate value. They are still only prospects, but the success attending the development done commands attention and gives promise of an exceedingly large, but low grade, deposit of copper ore. The location of the

properties is ideal for the cheapest kind of mining, and the facilities for cheap transportation by vessel could scarcely be improved upon.

The grade of the ore, as already noted, is low, probably not higher than 2 or 3 per cent. copper, with little or no gold and silver values, but the fact is that the values have increased with depth, so far as development has proceeded.

Last Chance Group.—The Last Chance group of six claims, the Last Chance, Goodenough, Jumbo, All Right, No Doubt and Star, owned by Messrs. Wintermute, McEachern and Jones, lies to the southwest of and adjoining the Swede group near the shore of the next bay to the south. These claims are more recently located than the Swede group and have not had the same amount of development work done, but such as has been done, a couple of large open cuts, discloses conditions almost identical with those found in the Swede group, and, as the ore found is also in direct line with the mineralized zone on the Swede group, it is fair to suppose it to be a direct continuation of the Swede group deposit. The most important development work has been done on the Last Chance claim, at a distance of 1,600 feet from the bay, at an elevation of about 200 feet, and consists of an open cut in rock 45 feet long in a N. and S. direction, across the ore body, and has a face of six feet in depth. A general sample, made up of small pieces broken off the ore already mined, gave, upon assay, copper 2.7 per cent., silver 0.4 ounces to ton, and trace of gold.

The country rock has been classed, after microscopic examination, as a "Porphyritic diabase."[2]

As far as the development has gone, these claims give promise similar to the Swede group, and the camp as a whole indicates the presence of very large quantities of low-grade copper ore. The deposits are so admirably situated for cheap mining and transportation, the character of gangue matter is such as to permit of very cheap smelting, so it is estimated that such ore is well within the commercial limit and can be treated at a profit, despite the fact that there is no appreciable quantity of gold or silver present.

The formation in which these deposits occur would appear to extend for a considerable width east and west, and is found again to the northwest on the shores of Skidegate Channel, near the Narrows, constituting a large area of territory which may prove productive.

On Septemeber 2nd, the trip northward was resumed in the gasoline launch to Skidegate, a further distance of 45 miles, a stop being made at the Old Shaft, some seven miles south of the Sand Spit.

Old Shaft.—The Old Shaft, judging by the size of trees growing on the old dump, was sunk some 40 or 50 years ago, but by whom it is not known, nor does there seem to be any Indian tradition regarding it. The property has recently been taken up again by Shelden and Shabbard, who have bonded it to D. R. Young and associates, who were unwatering it, employing one white man and two Indians. At that date the shaft had been unwatered to about 90 feet depth, and the foreman reported having sounded it for a further depth of 45 feet. Some short distance above the 90 foot mark, two cross-cuts had been found, one to the east and one to the west, extending about twenty-five feet from the shaft. The shaft had not been cleaned out, so, of course, nothing was visible in it as to ore.

The country rock in the vicinity, as exposed on the beach, is an agglomerate, in which a fissure was seen a few inches wide, carrying copper pyrites in quartz. Selected samples of clean mineral assayed 10 per cent. copper and two ounces of silver to the ton. This fissure led directly to the old shaft, distant only a few feet, and it was evidently on this fissure that the shaft had been sunk and along which the two cross-cuts had been driven. The fissure, as seen on the beach, was too small to be of any importance, and the old dump exhibited no commercial ore.

Gold Harbor.

Mr. John McLellan, a British Columbia assayer, has been working during the past summer at Gold Harbor, a bay of Moore Channel, on the west coast of Moresby Island, just south of Skidegate Channel. It was at this point the Hudson Bay Company, in 1852, found and mined a deposit of gold bearing quartz. Mr. McLellan examined the old workings but could find no continuation of the values, though he discovered in the vicinity another small quartz vein carrying gold in considerable proportions. He reports the vein as being rich but very small; he erected last season an arrastra driven by water power and managed to extract a certain amount of gold, bringing a small "brick" to Victoria.

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[1]Microscopic examination made by Dr. Dresser, of McGill University (4,613).—This is a massive, dark green, fine grained rock, showing spots of epidote, and a few grains of pyrite and pyrrhotite. It is found to consist essentially of plagioclase, feldspar and pyroxene. There are also present accessory magnetite, as well as the secondary minerals, chlorite and leucoxene. No quartz or olivine could be found. The structure is ophitic, and the rock is consequently a diabase.

[2]As result of microscoic examination, Dr. Dresser, of McGill University, reports: "The rock is fine grained and of a uniform green color. The slide is found to be much decomposed. Feldspar is present in a few phenocrysts and in more numerous small lathe-shaped crystals of plagioclase. There are numerous grains of augite and epidote with much chlorite, the latter being in larger irregular masses. It is a Porphyritic diabase.

DIABASE AND GABBRO.

The diabases are principally composed of plagioclase, augite, magnetite, and sometimes olivine. They have a somewhat wide range in composition. Silica may be present from 49 per cent. to 57.5 per cent.; alumina from 12 to 18 per cent.; ferric and ferrous oxides together from 8 to 13.5 per cent.; magnesia up to 11 per cent.; lime up to 11 per cent.; the alkalies up to 6.5 per cent. There are, of course, many minor constituents.

The gabbros consist mainly of plagioclase and pyroxene, with various admixtures of other minerals. Silica ranges from 45 to 56 per cent.; alumina from 13.5 to 30.5 per cent.; ferric oxide up to 3 per cent.; ferrous oxide up to 15 per cent.; magnesia up to 16 per cent.; lime up to 17 per cent. Alkalies and other minor constituents are present in small amounts.

SAMPLING OF MINE DUMPS.*

By Henry S. Munroe.

It frequetnly happens that mine dumps contain low grade ore, originally rejected as too poor for treatment which later, under more favorable conditions, may be worked with profit. The old waste dumps may thus constitute an important asset of the mine, the value of which must be accurately determined. The sampling of such waste dumps presents a difficult problem. Portions of the dumps which have accumulated during periods of active development; for example, during the sinking of a shaft or the driving of a tunnel, may be absolutely barren; while other portions representing the growth during periods of wasteful or careless management, may be very rich. In any case the distribution of values is likely to be very irregular. If the dumps be formed in the ordinary way, by dumping cars at the top of the bank, the stratification, and therefore the zones of rich and poor material, will be in inclined layers. Moreover, as the cars are dumped at the top, the larger pieces tend to roll to the bottom of the slope, while the fine stuff lodges and remains near the top. The upper portion of the dump, as containing most of the fine material, is therefore likely to be rich; and the bottom, consisting of lumps and coarse material, is in general poorer than the average.

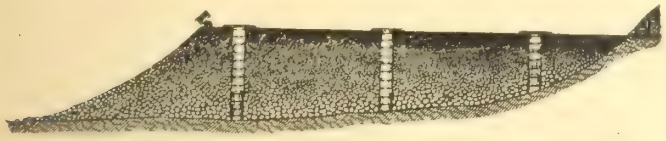


FIG. 1. Longitudinal section of a mine dump with shafts sunk for sampling.

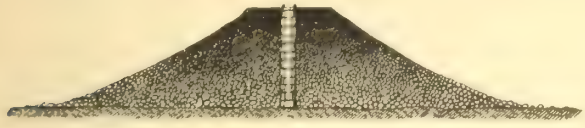


FIG. 2. Cross section of a mine dump with sampling shaft.

Figures 1 and 2 are intended to illustrate this sizing effect, which has been purposely exaggerated in the drawings. In practice many large lumps will remain in the upper part of the dump and some fine stuff will be caried down the slope. The outside of the dump represents in most cases the later additions only, and the material deposited in earlier years is deeply buried. Finally, the dumps will contain much ore and rock in very large lumps and a due regard to the effect of such large pieces on the value of the sample taken, will necessitate handling large quantities of material. For example, if we adopt the inch-ton sampling scale,* the presence of ten inch pieces would indicate one hundred tons as the minimum total weight of samples to be taken. Or even if we take a two-and-a-half-inch-one-ton sampling scale, the presence of many lumps 25 inches in diameter will lead to the same result.

The usual method of sampling a dump is to take numerous small samples from the sides and top, which are either assayed separately or united to make one or more large samples. If this method be followed the points to be sampled should be determined by measurement, either at the corner of 25-foot squares, or better, in some cases, located on contour lines at uniform distances apart. In either case the samples should be given weight in the final average in proportion to the amount of ore that they may represent in the original pile, bearing in mind the probable concentration in values at and near the top of the dump. If the samples be located on contour lines, those on each contour may is essential. If the crushing be done by hand, with be combined and averaged separately, and the value

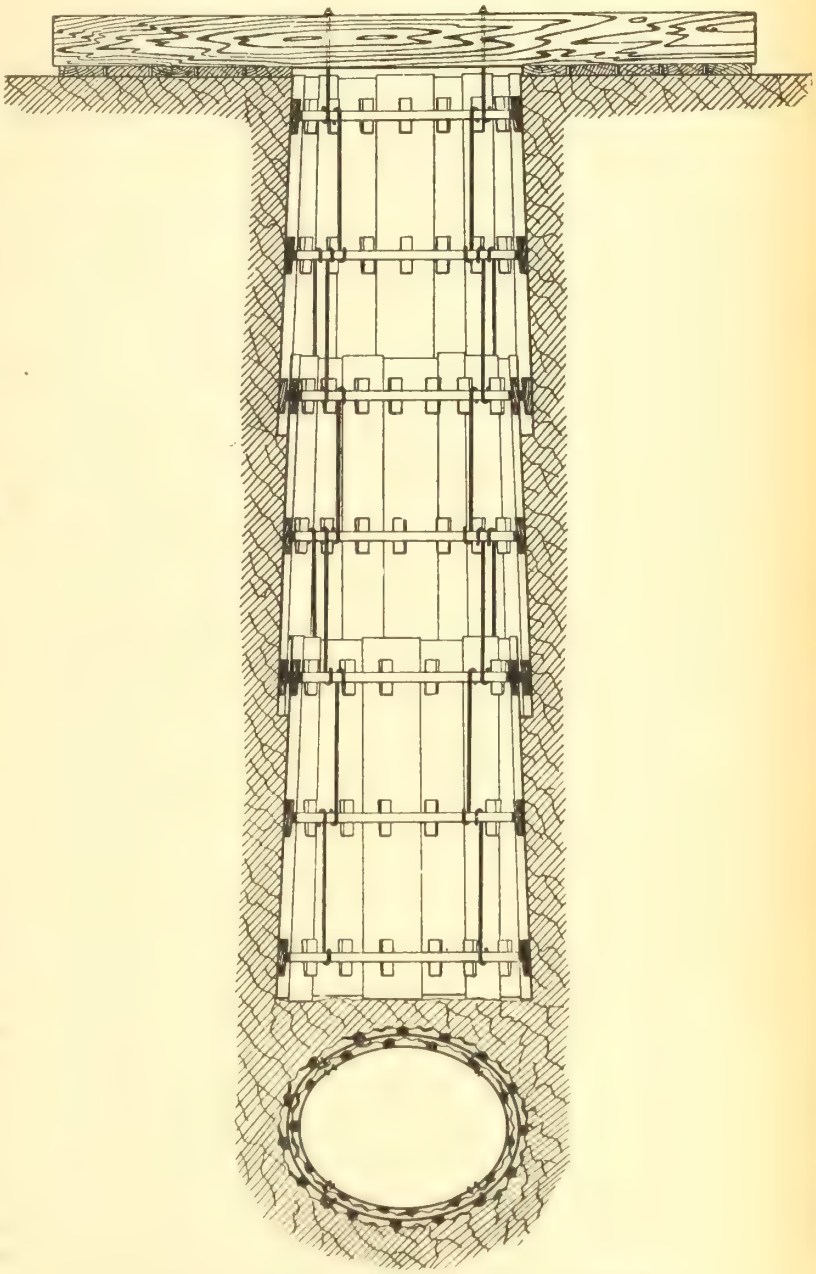


FIG. 3. Shaft lined with corrugated iron. Scale $\frac{1}{24}$.

for each contour averaged on the basis of the horizontal dump area represented.

In dump sampling, on account of the large amount of material to be worked down, a small crushing plant hammers and by mortar and pestle, a large force of men is necessary and the effective protection of the

*School of Mines Quarterly, Columbia University.

samples is made difficult. The crushing machines should be somewhat larger than the usual laboratory size and should have a capacity of several tons per day. The crushing plant may be installed at some central point where power is available and where the necessary counter shafting can be erected. Such a plant will be expensive, but in an important examination may save its cost several times over.

Last year the writer had to determine accurately the value of some very large dumps at a mine in Bolivia. In order to avoid the sources of error incident to sampling in the ordinary way, and to reach the deeply buried portion of the dumps, which were believed to be rich, it was decided to attempt the sinking of vertical shafts through the dump to obtain the desired samples. The advantages of this method of dump sampling are evident. Each shaft traverses numerous inclined layers of which the dump is composed and thus represents the accumulations of several years and not recent additions only. By dividing the excavated material into a number of samples, each representing five or ten feet of depth, the distribution of values from the top to the bottom of the dump may be studied, and each sample given its due weight in the final average, in proportion to the volume of ore represented. Finally, if the shafts be pushed to the bottom, not only are the deeply buried portions of the dumps reached and their value determined; but points in the original surface of the ground, on which the dump has been built, are located; from which points the contours of such buried surface may be determined, and the actual cross sections and volume of the dump computed with a greater degree of accuracy.

In order to limit the amount of material from each shaft and avoid the expense and delay of crushing unnecessarily large samples it was decided to sink shafts of as small diameter as practicable. In the loose and dry material of the dumps not only was a shaft lining required, but in all cases it proved necessary to drive the lining down every few inches, as the sinking progressed, or in other words some form of spiling or poling was essential to success. Suitable plank and timber for such work are not easily obtained in Bolivia and are expensive. Plank and timber also take up much room in the shaft, requiring that the excavation be made larger than desirable. Under these conditions it was decided to try the experiment of using light iron rings instead of timber, backed by sheets of corrugated iron instead of a wooden lining. Corrugated iron is largely used in South America for building purposes and is therefore kept in stock and was readily obtainable in sufficient quantity and at reasonable cost. This material, cut into pieces of suitable size, made excellent poling boards, light and stiff and occupying but little space in the shaft. By reason of its smooth surface, the iron sheets drive easily with but little friction, requiring light blows only of a three-pound hammer. After experimenting with sheets of different sizes it was found that the best results were obtained with pieces about five feet long and a foot or less in width. To support this corrugated iron lining, elliptical rings of ⅜ by 1 ½inch bar iron were used, the ends being welded together. The rings were made of elliptical rather than circular form to permit the large bottom rings of each set to be passed through the smaller upper rings. Also the elliptical form, for equal areas, gave the workmen more room for pick work and shoveling. These rings were supported by hooks of ⅜ inch rod as shown in the sketch, Figure 3. After experiment with rings of different sizes, the dimensions indicated in the figure were adopted, the middle ring being 32 by 28 inches and the upper and lower rngs respectively two inches smaller and larger each way. A shaft of these dimensions can be sunk rapidly and gives a sample of manageable size. With small men it proved practicable to use rings of less dimension than this. In one case a shaft was sunk successfully to a depth of 22 feet with rings averaging 22 by 28 inches. In all, 9 shafts were sunk in 8 weeks' time, the deepest being about 60 feet. This system of shaft lining, though composed of light material, possesses considerabls strength and stiffness. The overlapping of the corrugated sheets and the double rings, tightly welded together where the sections join, add much to the strength of the lining. The hooks are elements of weakness as these will straighten out at about one-fifth of the ultimate breaking strength of the rods. The strength of these hooks may be increased by always inserting the point of the upper hook in the space between the ring and the corrugated iron sheets, and by fastening the point of the lower hook to the rod with a slip ring. The work of shaft sinking will be facilitated by having on hand extra hooks, shorter and longer than the standard length.

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*Richard's "Ore Dressing," page 852.

AN ELECTRO-MAGNET FOR TESTING THE SUITABILITY OF AN ORE FOR MAGNETIC SEPARATION.

By L. H. L. Huddart, Associate.

Paper read before the Institution of Mining and Metallurgy, April, 1908

In the course of the discussion upon the paper by Mr. Amos Treloar and Mr. Gurth Johnson, it was suggested that any sketches describing a suitable small electro-magnet would be welcome to those interested in the separation of minerals magnetically.

The following note is therefore contributed in the hope that it may be of some little use.

The sketch shown illustrates an apparatus that has been found to be convenient for the quantitative determination of the separation to be expected in treating a given ore by means of a powerful magnet. In general, better work will be done by a laboratory apparatus than by a full-size machine. At the same time, the performances of the former will have a fairly constant difference from that of the latter, so that a good idea of the way to proceed with a given ore will be obtained.

Sampling.—A small machine will deal with only a small quantity, and to obtain representative results of value it is essential that the sample used should be a fair one of the whole ore. As much care should be taken in obtaining the sample as is ordinarily employed in preparing ore for assay.

Reduction.—The size of particles will depend upon the nature of the ore and the method of occurrence of the minerals which it is desirable to separate. They should not be too fine to commence with. Careful ex-

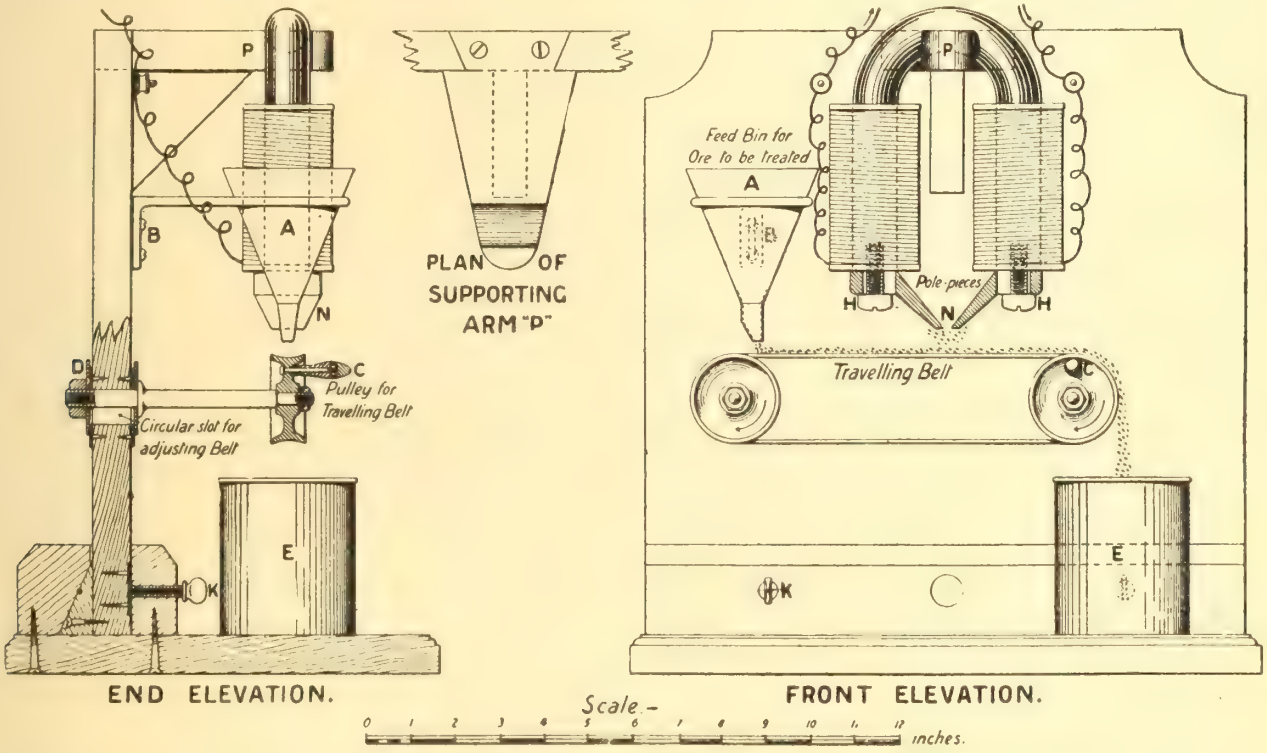
amination of the material that passes the magnet and falls into the hopper, E, will show to what extent further reduction is necessary. It is often useful to look at the discharged particles under the lower power of a microscope.

Further experiments should be made to find out to what extent the separation should be divided into stages.

Magnetic Field.—The most suitable strength for the magnetic field into which the sample will pass as it is carried along by the belt can be found by experiment. Commence with a low field, and extract the more permeable minerals first.

Such minerals as magnetite and magnetic pyrites should be taken out first with an ordinary horseshoe magnet.

The Apparatus.—The machine, as shown in the illustration, consists essentially of a 6-inch soft iron electromagnet, with 1-inch core, fitted with brass bobbins



wound with 18 B.W.G. copper wire. Two special pole pieces (N) are provided; they are slotted to allow of the adjustment of the air gap.

The magnet is suspended from a bracket on a hardwood stand, the back of which is secured to the base by means of two pinching screws (K). The arrangement shown in the sketch was designed to give a rigid, yet easily dismounted, attachment.

Upon the same stand there is also mounted a copper hopper with a support slotted to allow of vertical adjustment. This hopper feeds on to an endless belt running on two grooved pulleys, one of which has a small handle, C. These pulleys have about ¾ inch adjustment in each direction, to permit of the belt being placed into the required position beneath the pole pieces.

Method of use.—After suitable reduction, the sample (or part of it) is put into the hopper, A. The rate of feed to the belt depends upon the height of the spout above it; in this manner the feed can be adjusted to some degree of nicety.

The endless belt is driven by hand by means of the small handle, C, and the ore travels slowly beneath the pole pieces.

The distance of the belt below the poles can be varied by slackening the nuts, D, which clamp to the back the small shafts upon which the pulleys run. A suitable distance is found by trial. The ore that is not picked up by the magnet is carried on and falls into the hopper, E.

After running a short time, if there is much magnetic material present, it will have to be removed from the pole pieces, which is conveniently done by placing a piece of stiff paper, or sheet copper, beneath the poles and switching on the current.

The strength of the field is varied by loosening the screws, H, and moving the pole pieces closer or further apart, according to whether a stronger or weaker field is required.

The current may be supplied by a hand dynamo, off the mains, after a suitable resistance has been inserted, or by means of a secondary battery. Two cells do admirably. The battery is the most convenient, and, in a case, is very portable; but of course it is only available when there is a source of current by which it can be charged from time to time.

The sketch shows a form designed for use in the field, with a hand dynamo of 3 amperes at 10 volts and 3,000 revolutions per minute. A pocket ammeter to 5 amperes is useful.

The whole takes down and packs into two boxes, which are about one man's load, and can easily be transported by carriers. The cases are carefully fitted, so that no movement is possible within them.

The form of instrument which has been described was made for the author's use in Africa.

Those who are interested in this subject will find useful information in the admirable paper by Mr. T. Cook, A.R.C.Ss.I., F.G.S., on the "Use of the Electromagnet in Petrography." (Science Progress, No. 5, July, 1907.)

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Preliminary Report on the Klondike gold fields. No. 687, with map No. 688. G. S. D. Summary 1900.
McMillan River with map. G. S. D. Summary 1902.
Kluane mining district with sketch map. 1904.
White River and Windy Arm districts, 1905.
Old Valley gravels of the Yukon. Vol. III., C. M. I.
Note on the Windy Arm silver bearing veins. Vol. IX., C. M. I.

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Notes on Windy Arm mineral locations. M. M. 1905.

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The gold bearing alluvial deposits of the Klondike. Trans. M. & M. Vol. 8.
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British Columbia Report of Minister of Mines.—Containing statistics, annual reports from the mining divisions and special reports on various districts by the Provincial Mineralogist, the Provincial Assayer, and others. W. F. Robertson, Provincial Mineralogist.

British Columbia Year Book.—Containing a resume of mining operations and reports of mining districts. R. E. Gosnell, Victoria.

British Columbia Mining Record.—A Monthly Journal, chiefly devoted to B. C. Mining. E. Jacobs, editor and manager, Victoria.

Canadian Geological Survey Summary Report.—Usually containing six or seven reports upon Western geology and mining.

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Loring, F. C.—Mining law and its bearing on the development of mines and mineral districts. Jour. Fed. C. M. I. Vol. III.

McDonald, Bernard.—Mining possibilities of the Canadian Rockies. Vol. VI., C. M. I.

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AIR-HAMMER DRILL CONTEST.

(Kindness of Mr. A. A. Cole, Mining Engineer T. & N. O. Commission.)

Nipissing Mine, May 7th, 1908.

Name of machine.—Waugh No. 8 C.
Weight of machine.—60 pounds.
Hole.—Vertical, up.

TIME.

Drills.	From Start.		Drilling.		Changing Steel.	
	Min.	Sec.	Min.	Sec.	Min.	Sec
		0	.	..	.	..
1st.	2	30	2	30	.	..
	2	50	.	..	.	20
2nd	5	30	2	40	.	..
	5	30	.	..	.	25
3rd	8	30	2	35	.	..
	9	00	.	..	.	30
4th	9	20	.	20	.	..
Total	9	20	8	05	1	15

Hole collared to start, 2½ inches.
Total depth drilled, 40¾ inches.
Net depth drilled, 38¼ inches.
Air pressure at start, 105 pounds.
Air pressure while running, 100-101 pounds.
Size of first drill, 1 13-16 inches.
Size of last drill, 1½ inches.
Inches drilled per minute, 4.10.

Nipissing Mine, May 7th, 1908.

Name of machine.—Sullivan D. 21.
Weight of machine.—70 pounds.
Hole.—Vertical, up.

TIME.

Drills.	From Start.		Drilling.		Changing Steel.	
	Min.	Sec.	Min.	Sec.	Min.	Sec.
	.	0	.	..	.	..
1st.	2	35	2	35	.	..
	2	45	.	..	.	10
2nd.	4	25	1	40	.	..
	4	38	.	..	.	13
3rd.	6	30	1	52	.	..
	6	50	.	..	.	20
4th.	8	25	1	35	.	..
Total	8	25	7	42	.	43

Hole collared to start, 3 inches.
Total depth drilled, 58¼ inches.
Net depth drilled, 55¼ inches.
Air pressure at start, 105 pounds.
Air pressure while running, 100-101 pounds.
Size of first drill, 1¾ inches.
Size of last drill, 1¼ inches.
Inches drilled per minute, 6.56.

Nipissing Mine, May 7th, 1908.

Name of machine.—Murphy No. 3.
Weight.—60 pounds.
Hole.—Vertical, up.

TIME.

Drills.	From Start.		Drilling.		Changing Steel.	
	Min.	Sec.	Min.	Sec.	Min.	Sec.
		0	.	..	.	..
1st.	1	40	1	40	.	..
	2	05	.	..	.	25
2nd.	3	45	1	40	.	..
	4	00	.	..	.	15
3rd.	4	30	.	30	.	..
	4	48	.	..	.	18
4th.	5	38	.	50	.	..
	5	52	.	..	.	14
5th.	6	45	.	53	.	..
Total	6	45	5	33	1	12

Hole collared to start, 3½ inches.
Total depth drilled, 40⅜ inches.
Net depth drilled, 36⅞ inches.
Air pressure at start, 105 pounds.
Air pressure while running, 102½ pounds.
Size of first drill, 1½ inches.
Size of last drill, 1¼ inches.
Inches drilled per minute, 5.46.

Nipissing Mine, May 7th, 1908

Name of machine.—Murphy No. 3.
Weight.—60 pounds.
Hole.—45 degrees above horizontal.

TIME.

Drills.	From Start.		Drilling.		Changing Steel.	
	Min.	Sec.	Min.	Sec.	Min.	Sec..
	.	0	.	..	.	..
1st.	1	30	1	30	.	..
	2	10	.	..	.	40
2nd.	3	15	1	05	.	..
	3	40	.	..	.	25
3rd.	4	05	.	25	.	..
	4	55	.	..	.	..
4th.	5	30	.	35	.	..
Total	5	30	3	35	1	55

Second time for steel to be used.
Hole collared to start, 1 inch.
Net depth drilled, 37¾ inches.
Net depth driled, 37¾ inches.
Inches drilled per minute, 6.86.

Note.—The Sullivan machine is constructed so as to dispense with the collar on the shank of the steel. A striking block is inserted between the hammer and the steel. This is a slight sacrifice of efficiency for cleanliness.

CANADIAN MINING INSTITUTE.

Members elected at council meeting, May 2nd, 1908: H. S. Badger, M. E., Richardson Mines, N. S.; J. W. Bryant, M. E., Box 665, Victoria, B. C.; J. T. Fee, M. E., Cobalt, Ont.; Geo. L. Fraser, Mine Superintendent, Cobalt, Ont.; B. W. Lawson, Cobalt, Ont.; G. F. McNaughton, Cobalt, Ont.; A. H. Sancton, M. E., c/o Mussens Limited, Cobalt, Ont.; Bert. N. Sharp, M. E., Orient, Washington, U. S. A.; Robt. Turnbull, C. E., 23 Lake street, St. Catharines, Ont.; C. G. Williams, M.E., Cobalt, Ont.

Associates:—L. O. Armstrong, 221 Milton street, Montreal, Que.; Spencer Benerman, Midway, B. C.; C. L. Campbell, Box 85, Cobalt, Ont.; W. Teese Curran, Mine owner, 300 St. James street, Montreal, Que.; E. L. Douchette, Room 53, 112 St. James street, Montreal, Que.; G. A. MacPherson, M. E., Niagara Falls, Ont.; D. B. Rochester, Cobalt, Ont.; Robt. T. Walker, Cobalt, Ont.

Application has been received for membership from Mr. A. G. Larson, Superintendent of the Le Roi Mining Company, Rossland, B. C.

The following applications have been received for membership in this Institute during the past week:—A. G. Larson, Superintendent Le Roi Mining Company, Rossland, B. C.; R. P. Williams, Rossland, B. C.; Fred S. Peters, foreman Le Roi mine, Rossland, B. C.; W. S. Rugh, accountant Le Roi mine, Rossland, B. C.

INDUSTRIAL PAGE.

The Western Fuel Company of Nanaimo, B. C., have recently ordered from the Robb Engineering Company a 600 horse power 24 inch by 42 inch Robb-Armstrong Corliss engine for driving one of theim mine ventilating fans.

The Dominion Iron and Steel Company have recently ordered from the Robb Engineering Company one 20 inch and 28 inch by 36 inch tandem compound Corliss engine for endless haulage at their mines in Wabana, Newfoundland.

The Longest Narrow Gauge Light Railway in the World.—This descriptive pamphlet, a reprint from Engineering of July 19th, 1907, is issued by Messrs. Arthur Koppel, light railway engineers, 27 Clements' Lane, London, E.C. It gives an account of the Otavi Railway in German Southwest Africa, constructed for the Otavi Mines & Railway Company by Messrs. Arthur Koppel. It is the longest narrow gauge light railway in the world. It connects the Otavi copper district with Swakopmund, the only available shipping port, a distance of 361 miles. The construction was started in August, 1903, and was completed towards the end of 1906. During this period the rising of the Hereros complicated the labor question. Italian workmen were secured, but trouble again ensued. Finally Italian and Ovombo workmen completed the task. The whole story of construction is a modern romance.

Bulletin No. 1065, Side Dump Cars—The Atlas Car & Manufacturing Company, Cleveland, Ohio.—The varieties of the Atlas Car Company's side dump cars are illustrated in this bulletin. These are modifications of their Standard No. 217 car. Except two scale charging cars, equipped with scales for the weighed various classes of material used in smelters, concentrators, blast furnaces, etc. (Nos. 217-W and 217-OW.), these cars are all either-side-dumping. The steel bodies with malleable iron rockers and corners braced with steel forgings are strong and rigid. The frames are made heavy enough to guarantee a substantial factor of safety over the maximum load.

In No. 217-S, with capacity from 1 to 2 yards, the malleable iron rockers are recessed on both sides to engage the bale. The car can thus be hold in a semi-dumped position, which greatly facilitates loading. In this position the distance from top of rail to edge of loading side is but 22 inches. Special types are the Side Dump Electric Motor Car, Scale Charging Car, and One Side Rocker Dump Scale Car.

Sullivan Stone Channelers—Sullivan Machinery Company, Chicago, U.S.A.—Catalogue No. 61.—The channeler consists of a reciprocating engine, operated by steam or air power, mounted on a standard, and driving a steel bit, or gang of bits, fastened to the lower end of the piston rod. The standard is mounted on a frame or car, which runs on a track and is propelled back and forth by a feed engine. By cutting a narrow slot to any needed depth into the rock the channeler separates a portion of the whole mass without shattering. In quarrying the stone is channeled in four or even six sides and waste is entirely avoided.

Channelers are suited to quarrying marble, sandstone, limestone, slate, and soapstone. They are of three types—"rigid head" machines for vertical cutting, "swivel head" for marble and slate, and a third type for undercutting or horizontal channeling.

The catalogue describes the work and equipment of these machines.

The cutting capacity of the channelers is indicated by the fact that, under 100 pounds steam pressure, the Sullivan "VX" machine will cut sixty to seventy-five feet per day of Vermont or Pennsylvania slate. In soft Virginia soapstone the cut is from 150 to 250 feet per day. The total weight of the different types of channelers, including equipment, but without boiler, ranges from 23,300 pounds to 5,740 pounds.

EXCHANGES.

The Colliery Guardian, May 1st, 1908.—It is pointed out by the Colliery Guardian that ambulance work in the mine should precede rescue practice in the experimental gallery. "With regard. . . .to the saving of life in the coal mine, there is need for something more than the ability to wear a given pattern of breathing apparatus, and to perform a certain amount of laborious work under such conditions. The rescuing party must be trained to work together with a common object, rather than indivdually to vie with one another in penetrating long distances into the mine. . . . .By ambulance work in the mine, we do not mean the ordinary routine drill of a St. John Ambulance class. . . . What seems to be required is a special kind of ambulance instruction, adapted to the conditions present in the pit after an explosion or any other disaster of the first magnitude."

Mining and Scientific Press, May 9th, 1908.—In celebration of the arrival of the American fleet in the Bay of San Francisco, Mr. T. A. Rickard contributes an article entitled, "From Mine to Battleship" to this issue. His theme is white lead. He traces the story of its manufacture. From the lead mine, the reader is brought to the furnace, the pigment factory and, finally to the navy yard where the battleship is made whitely beautiful.

The Selby smelter, at the northeastern end of the Bay of San Francisco, supplies the white lead used at the Mare Island navy yard. One of the mines, from which ore is sent to the Selby works is the Bunker Hill and Sullivan, the most important single lead producing mine in America.

The Bunker Hill and Sullivan produces 40,000 tons of lead and 1,650,000 ounces of silver annually. The property is situated at Wardner, in the Coeur d'Alene, Idaho. The ore is found in old quartzite, which has been much metamorphosed. The galena has been deposited in the resulting cracks and fissures. Silver is associated with the ore in the rates of one ounce of silver to 44 pounds of lead.

A certain rough alignment of irregular ore bodies marks the continuity of the lode. The quartzite is full of slips and fractures, which serve as local boundaries for the richer bodies of galena. The galena replaces and impregnates the brecciated quartzite along channels created by the fractures extending along the footwall and away from it into the overlying rock. The ore is mined with little waste, and goes to the mill for crushing, classification and concentration. Argentiferous galena is the chief product, but there is also iron pyrites which carries silver. The problem is to save the lead and silver without the zinc.

The ore first falls over 1¼ inch spaced grizzlies, the oversize going to a Comet gyratory crusher, which crushes it to a maximum diameter of 2½ inches, and then spills into a horizontal bucking belt, where a couple of men are stationed to pick out the clean ore (galena) and the mine rubbish by hand. The belt delivers to roughing rolls, and from them, reduced to a size of about 40 millimetres, the ore is discharged onto an incline belt conveyor. Here it is joined by the undersize from the grizzly. The joint product is carried to the top of the mill proper and is fed into two Vezin samplers, one of which extracts as a sample one tenth of the total, and the next a tenth of the sample. One per cent. therefore is the final sample. This is reduced and prepared for assay daily.

The ore now drops into mill bins of 600 tons capacity, equivalent to a 12-hours supply. After passing through trommels a part of the ore (between 18 mm. and 36 mm. diameter) goes to the bull-jigs. The jig concentrate is shipped to the smelter and the middling is reground. The other oversize from the trommel is reground and again passed through the trommel, and thence to the jigs. Huntington mills, Spitzkastens, Callow settlers, Frue vanners and Wilfley tables complete the outfit. The principal features of the mill are the re-crushing by rolls, the passage of the coarse middlings through the rolls, and the grinding of the fine middlings in Huntington mills.

In March of this year, in 28 working days, the mill treated 30,600 tons of ore carrying 12.56 per cent. lead and 5.07 ounces of silver. The ratio of concentration was 4.6 into 1. Of the 7,686,720 pounds of lead and 155,142 ounces of silver contained in the ore, respectively 5,965,096 pounds of lead and 111,598 ounces of silver were recovered, or 79.4 per cent. of the lead and 71.9 per cent. of the silver, 77.6 per cent. total recovery. Fifty-two men are employed in the mill. The total cost of milling in March per ton of crude ore was 35.9 cents. Besides the concentrates saved in the mill, varying amounts of picked ore are shipped direct to the smelters. The total cost of freight and smelting is $19.61 per ton. The grand total for all operating costs is $2.438 per ton.

The Selby Smelting and Lead Company works were founded in 1868. Twenty-five thousand dollars worth of gold and 12 to 15 million ounces of silver are refined here annually. The chief supplies of argentiferous lead ore and of silicious gold-silver ores come from Idaho and Nevada respectively.

From the bins the ore and concentrates are taken to the feed floor where they are shovelled by hand into the blast furnace. This is 36 by 144 inches. The blast is under a pressure of 33 to 34 ounces per square inch. From 130 to 140 tons of charge is treated per day, exclusive of fuel or slag. Of the charge 60 to 70 per cent. is ore. It is the aim to have 15 per cent. of lead on the charge.

The charge of 7,700 pounds is made up of slime briquettes, roasted matte, limestone, ore, refinery by-products (mainly litharge), metallic iron, and coke. To this 20 per cent. of old slag is added.

The roasted matte contains 12 per cent. lead, 12 per cent. copper, 45 per cent. iron, 3 per cent. zinc, and 7 per cent. sulphur.

The scrap iron bought as flux often includes typewriters, frying pans, rifles, stoves, sewing machines and many other miscellaneous items.

When the copper accumulates in the matte beyond 16 per cent., it is re-smelted and brought up to 45 to 55 per cent. The matte and the pyritic ores are roasted in Ropp furnaces, provided with travelling mechanical rabbles.

From the blast furnace the lead flows into moulds and is cast into bars weighing 100 pounds apiece. These are elevated to the upper floor of the refinery. Here the process of liquation is carried on. The metals are separated by the difference in their smelting points. The softening furnace is the next step. The lead is now free from antimony, arsenic, and other impurities and is tapped into desilverizing kettles, made of cast iron and fired by oil. At 840 degrees, F., a slab of zinc, added to collect the silver and gold, melts. The zinc is skimmed off and when pressed carries 3,000 to 3,500 ounces dore. The lead, free from silver and gold, contains now about 0.5 per cent. zinc. This is eliminated in a reverberating furnace. The lead is cast into 100 pound pigs and is taken to the white lead plant.

The refined lead is now "corroded into white lead—a compound of lead carbonate and hydrated lead oxide. From 2,100 tons of refined pig lead the Selby plant manufactures 2,500 tons of white lead per annum. The lead is exposed to the corrosive effects of acetic acid, in specially built temporary stacks. The treatment requires 100 days of undistributed chemical action. The corroded lead is then separated from the uncorroded and ground and screened. After much special treatment it is finally turned out as commercial white lead, ready to be used on the armoured sides of Uncle Sam's noble fleet.

PERSONAL AND GENERAL.

Mr. Frank C. Loring has returned from London, England, where he spent the last two months.

Mr. Jules Labarthe of the Consolidated Mining and Smelting Company, Trail, B. C., has returned from Colorado.

Our thanks are due the Bureau of Mines, Ontario, for copies of the map of Larder lake, compiled by

Messrs. Brock and Bowen. The map is on a large scale and the geological legend is instructively simple.

Mr. A. J. McMillan, general manager of Le Roi mine, met Mr. T. D. G. Drayton, chairman of the Board of Directors, in Chicago.

Mr. B. A. C. Craig has returned from a visit to northern Manitoba. Mr. Craig has taken up some valuable clay properties in that district.

Mr. Francis J. Peck, of the firm Francis J. Peck and Company, Williamson Building, Cleveland, Ohio, has gone to report on a mining property in Southern Mexico for Cleveland capitalists.

Professor Manley B. Baker, of the School of Mining, Kingston, pased through Toronto on his way to Cobalt on May 19. From Cobalt, Mr. Baker will take a geological party to Lake Abitibi for the season.

Mr. Arthur Koppel, the founder of the Arthur Koppel Company of 66-68 Broad street, New York, died in Berlin, Germany, on May 13, of heart failure. Mr. Koppel was in his 57th year. He was born in Dresden, Germany, in 1851. At the early age of seventeen years he started in business. In 1876 he established the present firm, taking up the manufacture of all kinds of material for narrow gauge railroads. Through his energy and foresight the portable industrial track was given wide popularity. In 1905 the firm was made a stock company. It now owns fifty-two branch houses, distributed practically all over the world. The American business was established ten years ago. In 1906 Mr. Koppel purchased 700 acres of property in Beaver County, near Pittsburg, Pa., where he founded the township of Koppel and erected a thoroughly modern plant. Mr. Koppel's death will not affect the organization.

BOOK REVIEWS.

A Pocket Handbook of Minerals, by G. Montague Butler, E.M.—16 mo., IX + 298 pages, 89 figures. Morocco, $3.00. John Wiley & Sons, New York, 1908.— The first thing that strikes one about this neat volume is its convenient size. It is easily portable. In one of the capacious pockets of the regulation khaki prospectors' jackets it would be scarcely noticeable.

Another prominent feature is the blank space left throughout the book for field notes and remarks.

Again, the most important characteristics of each mineral are emphasized by means of heavy face type. This serves to impress upon the reader the distinguishing traits of a mineral.

The systematic arrangement by paragraphs is convenient and time-saving. The plan followed is as follows:

Dana Number. Name. Composition. Hardness.
Lustre.
Color.
Streak.
Cleavage or parting.
Tenacity and fracture.
Degree of translucency.
Specific gravity.
Miscellaneous (magnetism, taste, odor, dichroism, etc).
B. B. (before blowpipe). Here are included simple chemical tests.
Methods or habits of occurrence and crystal habit.
Description of varieties.
A list of resemblances for comparison.
A short statement of uses.

The title page informs us that there is little reference to chemical tests. Since the book is intended to be used chiefly as a guide in field work, this omission is wise. Usually the prospector must rely upon the simple physical tests of hardness, color, streak, lustre, fracture and specific gravity to guide him. The blowpipe is not often called into requisition by the prospectors.

There are supplementary chapters upon commercially important ores, retail prices of cut gems, values of metals and minerals. A glossary also is appended, along with useful tables. Numerous clear half-tones and diagrams are interspersed throughout the text.

The binding is strong, the type clear, and the arrangement good.

CORRESPONDENCE.

To the Editor

"Canadian Mining Journal."

Dear sir:—

At the meeting of the Canadian Institute held last month I promised to contribute some comments upon some points raised in the papers presented by Dr. Leith and Mr. Willmott. These remarks would have been incorporated with the discussions in the notes of the proceedings of the Institute, had it not been for the inability on the part of the secretary to furnish me with some of the items from one of these papers, so that it is now too late to have this done.

Both of these papers referred to were extremely interesting, that by Dr. Leith was entitled "The Iron Ore Deposits of Canada," and the other, by Mr. Willmott was on the "Iron Ores of Ontario," and the latter was only presented in part and extempore.

Dr. Leith classified the deposits according to their origin, dividing them into six classes, as follows:—

1st—Magmatic segregation.
2nd—Pegmatite type.
3rd—Lake Superior sedimentary type.
4th—Clinton sedimentary type.
5th—Carbonate type.
6th—Brown ore type.

This mode of classification is very useful, not only to the engineer, who will find himself more at home in making examinations and reports upon the deposits, but also to the experienced miner, who will find it a assistance in laying out his work correctly when endeavoring to win the ore from them.

Now it can readily be understood that, in the enumeration of the iron deposits of a country so vast as Canada, it is hardly possible for any single individual to possess an intimate personal knowledge of them all, and even if he wishes to confine the subject matter of his paper to those which are well known, he must perforce rely to some extent upon the opinions of others, whom he believes to be familiar with the localities in which the deposits occur. It is possible, therefore, owing to this dependence upon the work of others, that the explanation of certain phenomena might be based upon accurate observations, or again, it might be based upon the writings and teachings of persons, whose theories seem to have every appearance of fitting the case in question, or, yet again it might be based upon a

mere guess, in which the particular theory which happens to be the prevailing fashion is followed, whether it be the neptunic or volcanic. In this manner it may occur, quite inadvertently, that we may place statements on record in our writings which we would most assuredly have omitted, had we possessed an intimate personal knowledge of the actual facts of the case.

I might mention one single instance of this, the genetic occurrence of the Atikokan magnetites; these are classed by Dr. Leith under heading No. 2 of his table; this classification is erroneous, and the error can readily be shown, since no deposits afford more simple problems for the observer than these. Had Dr. Leith consulted my paper on "The Atikokan Nickeliferous Pyrrhotite Deposits and their Origin," Vol. IX, of the Proceedings of the Canadian Mining Institute, he would have not been guilty of such a lapsus. But I must excuse him because he told me since that he had forgotten that paper.

Not so easily, however, can I forgive him his statement, or rather I should use the plural and say statements, for I find it repeated several times, in other publications, to the effect that the occurrence and discovery of iron ores on this side of the international boundary in the vicinity of Lake Superior, was disappointing; especially, in speaking of the Animikie iron-bearing rocks, he asserts that, if 200 feet more of this formation had been eroded, the whole of the formation would have totally disappeared. This is a belief that originated with Van Hise, who promulgated this theory, in spite of the fact that he had no direct or personal knowledge of the facts, then Dr. Leith follows in his footsteps, and, last in order comes Mr. Willmott.

Let us consider upon what basis these assertions rest. Merely upon the experience in that portion of the Animikie formation lying in proximity to Loon Lake, on its southern shore, at a distance of about 23 miles from Port Arthur, in a northeasterly direction, and upon the knowledge of the locality adjoining Gunflint Lake to the west, situated about 90 miles southwest of Port Arthur. The former district forms the northerly margin of the iron-bearing rocks, which at that point are only a few feet in thickness, and consequently the hematite found there is in places very shallow. The latter region is the western boundary of our Animikie rocks, which are cut out at that point by the intrusion of a number of different eruptive rocks. Now, what I would ask is, whether a man is justified in judging a formation, such as is found here, over one hundred miles in length, and at many points over twenty miles in width, and making an estimate of its probable value from merely examining the margin, or should he not rather for his opinion on such a large area by considering the formation in toto? The latter is surely the only proper method, and if these gentlemen had taken the occasion to consult my monograph on "The Genesis of the Animikie Iron Range," in the Proceedings of the Canadian Mining Institute, Vol. VI, 1903, pages 243-253, they would have discovered that this formation is much thicker on this side of the boundary line than it is on the other. Dr. Selwyn estimated its thickness to be about 12,000 feet, but we would come nearer to the actual facts if we divide this figure by four, and then it would only be as deep as this in the deeper basins. If this be the case, I fail to see any good reason why we should not find as good iron and as large deposits of hematite ore in our own rocks as are found on the Mesabi or other Lake Superior hematite ranges. Throughout the whole of this series of ranges the rock formation is identically the same, forming, in Pre-Cambrian, or one had preferable call it, Post-Laurentian times, one continuous and uninterrupted rock mass. The fact that the same large deposits of hematite have not been found here as have been opened up on the other side is easily accounted for—we simply have so far neglected to prospect our Animikie rocks: the little, however, that has been done and the results attained thereby should have given any one sufficient encouragement to go down into the deeper basins of this rock, in which it may reasonably be expected that we shall find larger and purer deposits of hematite. I venture to predict that, as soon as much diamond drilling has been done here, as has been done on the Mesabi range alone, both Dr. Leith and Van Hise will doubtless be only too willing to retract the statements they have made about our Animikie range.

Dr. Leith's statements I find more pardonable, because I can easily understand his reluctance to contradict his former mentor, Prof. Van Hise, although I have observed that, as regards the origin of these rocks, their ways are already beginning to diverve, and that Dr. Leith has started travelling upon a road that is somewhat more direct and also more correct. I welcome his company thereon.

Towards Mr. Willmott I hardly think that I can extend so much mercy, because for several years he lived here himself, and for a still longer period had prospecting parties throughout the district. It was, therefore, to be hoped that he would have been too well informed to fall into such glaring errors. I only learned of these erroneous statements upon reading his paper as published in the "Journal," these subjects not having been touched upon in his extempore discourse at the meeting.

What appears to me to be a very grave omission has been made by both these gentlemen, and I cannot rest without alluding to it; for they hardly mention my special big pet, the Mattawin iron range. The reader can well understand my sentiments when I state that this range contains perhaps the largest low grade iron deposits of which we have any knowledge. The figures will speak convincingly enough for themselves. The range commences about twenty miles west of Port Arthur and ends in St. Louis County, Minnesota, thus being nearly 100 miles long. Some of the individual deposits are 500 by 1,000 feet, one 660 by 3,000, and another 1,000 by 10,000 feet, and all of them have a depth of at least 5,000 feet. Many other deposits are found here of a similar size. Now, if my readers will kindly figure out how many million tons of iron ore these three first named deposits alone contain, and how many years they would last the population of Canada, when they were mined and reduced to iron and steel for their use, after having worked out this calculation, they will not consider it so very extraordinary for me to feel somewhat aggrieved at the light-hearted omission made by these two gentlemen who take so much interest in the problems of iron ores.

I can now let Dr. Leith step down from the stand, but I would like, with his kind permission, to devote a little more time to Mr. Willmott.

During almost the whole of last year I was absent from home and in consequence I had perforce to neglect to a great extent the perusal of mining and other journals. A few days ago, however, the November number of "The Canadian Mining Journal" came acci-

dentally into my hands, and upon it my eye was caught by the heading of a paper entitled "The Origin of Deposits of Pyrites," by Mr. A. B. Willmott.

I would ask Mr. Willmott to bear with me while I offer a few corrections as regards the nature and origin of some of the sulphide of iron deposits quoted by him. He attributes the origin of a large number of the pyrite deposits to sedimentation, and refers, for support, to Beck, Kemp and others. Both of these observers, however, classify pyrites deposites according to their different origins, and cite cases of different modes of sedimentation. Mr. Willmott in his paper enumerates a multitude of pyrites deposits, but I fail to find any explanation as to what kind of sedimentation he ascribes their occurrence, although it ought not to have been a task of very great difficulty to deduce some theory as to their origin from the rocks associated with them, from their physical structure and from the often peculiar character of the enclosing rocks.

Mr. Willmott speaks at length of the Michipicoten and surrounding district, he traces the association of the different minerals with the pyrites, he describes also the peculiar shape of the immediate environments, their pond-like shape surrounded by rocks, or the rounded or elongated depressions in which these deposits are found, but in spite of all that he speaks only of sedimentation—what kind of sedimentation, then, does he refer to?

Any person who is acquainted with that country is also well aware that, in both pre and post-Cambrian times there was a period of great volcanic activity, as witness to which we have the vast number of basic rocks, tuffs and granites. With this knowledge to guide us, and from observation of the locations in which these pyrites deposites are found, would it not be reasonable for us to come to the conclusion that some of these pond-like places or rounded depressions are the collars and vents of craters, vents of geysers or fumaroles, such as we can see in several places in this locality, in a beautiful state of preservation. At Steep Rock Lake we find similar pyrites deposits of a high grade limonite and manganese. In the immediate neighborhood we find some of the most beautifully preserved geyser vents that I have ever seen dating from a period so remote. In addition to these geysers, there must also hav been numerous mineral springs carrying various mineral contents in solution, similar to those which we can see occurring to-day in the Yellowstone Park. Now there can be no doubt of the fact that these Steep Rock Lake deposits are produced by mineral springs coming from a subterranean source, and if we connect these deposits with volcanism it would only be a natural inference that the Michipicoten deposits were produced in the same way. But in that district there occur not only iron di-sulphide deposits, but also some very large deposits of pyrrhotite, one of which is especially remarkable for its size and massiveness. The one I refer to is found on locations 223 and 224X, north of Cuthbert Lake, and this deposit no one would surely classify as a sedimentary product—it is as clearly a magmatic segregation product as those in the vicinity of Sudbury, carrying a certain amount of nickel. In addition to this one, there are a number of similar examples that might be quoted.

There is no doubt that the Helen ore is to a large extent an oxidation product, from pyrites and siderite, but these minerals are not of the same age as the Animikie rocks, as has been repeatedly asserted, but date from the time of the greenstone eruptions, which occurred after the Animikie had been laid down.

Mr. Willmott alluded to the 'pyrrhotite" deposits, near the Kaministiquia River, and those near Schreiber, as "pyrites,' and to them he also attributes a sedimentary origin. This opinion is clearly erroneous, for there can be found no truer type of a magmatic differentiation products than these deposits, which are quite numerous in both localities. The pyrites found associated with the Schreiber ore exists only at the surface, consisting, usually, of a shallow layer from about one foot to a foot and a half in thickness, and represents merely a re-arrangement of the molecules from FeS_8 to FeS_2.

Towards the close of his paper he speculates on the origin of this pyrites, arriving, however, at no definite conclusion. He does not know how silica, iron and sulphur were dissolved, now how they were precipitated, but he says that there must have been volcanic activity at that period, but this activity only served to add mechanical sediments to the chemical. Might it not have been expected that the thought would have arisen that these deposits in the Michipicoten district and elsewhere are all the products of volcanism, partly produced by the after action of volcanism and partly as the direct result of the same agency?

Mr. Willmott asks how the silica, iron and sulphur were dissolved and precipitated. Let me ask him, in turn, how the silica, the iron, the copper and other metallic sulphides are carried into the fissures of the rocks, forming veins, or into porous rocks strata, forming impregnations. Do not the geysers and the many hot and cold mineral springs of the Yellowstone Park and of Iceland, and those found throughout Europe and Australia and elsewhere, give us some idea of the manner in which lime, silica, iron and other rock or metallic minerals are dissolved, or are found by us in a state of solution, and are precipitated? And if we picture to our minds the remote periods, with their accompaniment of enormously greater volcanic activity, during which these pyrites and pyrrhotite deposits had their origin, it should be a matter of no great difficulty to realize the manner in which these phenomena occurred.

F. HILLE, M.E.

Port Arthur, April 27, 1908.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

There is very little to chronicle at the collieries at the present time, a sure sign that all is going well. The mines have got into their summer stride, and some remarkably good outputs have been made. As we forecasted some time ago the mines of No. 2 colliery district have made a record. On the 14th of May, No. 2 colliery had an output of 3,221 tons and No. 9, an output of 1,879, making a total output for one day from one shaft of 5,100 tons. The previous record for this shaft was 4,656 tons. It would be interesting to know whether this is not a world's record. No. 6 colliery is also doing well having reached 1,200 tons on one day this fortnight. No. 10 mine, the Emery, has also the highest output that it has ever made to its credit during the same fortnight, namely 718 tons. We think we are safe in saying that this is the largest output

ever produced from a purely longwall mine in Nova Scotia in one shift. With the exception of No. 3, all the Dominion collieries are on single shift. Another record was an output for all collieries of 15,539 tons on single shift. And yet if one enquires for news around the collieries we are told there is "nothing doing."

The Hub Colliery commenced to hoist coal on the 18th, after a six weeks' rest. During this time the mine has been thoroughly cleaned up; the main deep has been straightened and widened and an electrical endless haulage system installed. Two new electrically driven pumps have also been completed, and extra boilers and compressor plant installed. A new man hoisting engine has also been installed. The main deeps are about a miles under sea beyond high water mark, the coal is dipping at about the same pitch as formerly and maintains the same thickness. The mine has been idle rather longer than was anticipated, but from now on it should give a good account of itself.

At No. 6 Colliery a powerful new haulage engine is being put down, the main deep is being double tracked and put into shape for endless haulage, when the output is capable of being materially increased. The fact that this mine is producing somewhat like 20,000 tons a month, all of which is very readily absorbed is a sufficient commentary on the commercial qualities of this coal.

The Brooklyn Daily Eagle prints very complimentary remarks about Nova Scotia's possibilities as a country of mining investments. This paper says: "It may be said, without making use of extravagant language, that there is not a country upon the face of the earth which offers such absolute safe returns upon mining investments as the Province of Nova Scotia." It makes a statement also which we think is a little remarkable, namely, that the Dominion Coal Company has proved that its mines are capable of an output of 3,500,000 tons per year for a thousand years! Not that this need worry any Nova Scotian, for a thousand years is a long time. It should comfort Steel and Coal shareholders a little. The Brooklyn paper refers to Nova Scotia's gypsum exports, and we think that in her stones will be found the greatest wealth of Nova Scotia. There is in this province gypsum, marble, porphry, syenite, fine sandstones, jade, talc, mica, coal and iron. These we think will prove more precious than gold and silver. We hope the Brooklyn Eagle is right in its estimate of Nova Scotia's possibilities, and as to Dominion Coal, well, in a thousand years we shall be where steel will cease from troubling and coal will be at rest.

ONTARIO.

Cobalt.

The shipments from the camp for the week ending May 16, amounted to 447 tons. The shippers were as follows: Cobalt Lake, Cobalt Central, Kerr Lake, La Rose, McKinley-Darragh, Nipissing, Nova Scotia, O'Brien, Right of Way, T. & H. B., Temiskaming, and King Edward.

Nipissing.—A shaft is being sunk on a vein in the northeast corner of the town of Cobalt. A diamond drill is also in operation close by.

At a meeting of the directors of the Nipissing Mines Company (the holding company), E. P. Earle was re-elected president, L. B. Kendall, vice-president and John Josten, treasurer. The office of the company has been moved to 71 Broadway, New York.

Right of Way.—On May 19, thirty tons of high grade ore were shipped to Copper Cliff.

Seventy-five men are now employed in the various workings.

Lawson.—A small force of men are now at work trenching.

Cobalt Central.—The Standard Cobalt Mines Company, one of the subsidiary companies of the Cobalt Central, has leased 40 acres adjoining the Big Pete on the south. The lease, which is from the Bailey Cobalt, is on the basis of 50 per cent. royalty. The period is for two years with an option for three additional years.

Youngstown Cobalt.—A small steam plant has been purchased and will be installed on the property of the company, northwest of Sasagina Lake.

T. & H. B.—No. 2 level east, is showing up some good ore. On driving east on the cobalt vein, the ore is beginning to show native silver. There was no silver at all on the surface, in this vein.

Chambers-Ferland.—Arrangements have been made by this company to obtain air supply to operate drills, from the La Rose Company. Pipe lines are being laid from the La Rose to the No. 1 and No. 2 shafts. A careful sampling of the vein in the bottom of the No. 1 shaft, about 45 feet in depth, gave a value of 5,100 ounces of silver.

Casey Cobalt.—Twenty-five men are at work here. A station is now being cut at the 165 foot level.

Silver Leaf.—In the north face of the shaft, at a depth of 140 feet, a new vein running at right angles to the main vein, has been encountered. The values in the main vein are as high as ever and the outlook is encouraging.

The impression got abroad that this mine was being worked on a lease, but the facts are these: instead of receiving a salary, the manager, Mr. Symmes, receives 10 per cent. of the net proceeds and out of this he pays the mine superintendent's salary.

Shamrock.—Half a twelve drill compressor and a sixty and eighty h. p. boiler will be installed at once and active work begun under Mr. McPherson, who will have charge.

Little Nipissing.—A car of ore will be shipped in a few days from the Peterson Lake lease of this company. Arrangements have been made to secure an air supply for operating drills and a hoist from the Nipissing Company. Active work will be started as soon as the connections are made. The shaft which is now down 45 feet, is being timbered and a water tight concrete cellar is being made. There is every prospect of this mine becoming one of the important shippers in a short time.

O'Brien.—Work has been started cleaning away for the new concentrator to be erected. This will cost $125,000 and will be capable of treating 100 to 150 tons a day.

King Edward.—A ten stamp mill has been ordered from the Allis Chalmers Bullock Company. This is for the concentrating plant.

Crown Reserve.—At a meeting of the directors of this company, Mr. Samuel Cohen was appointed general manager. Mr. Cohen, who had a wide experience in the Cobalt district, has been in charge of the development of the property since October. A extensive system of development has been planned. The working shaft, which is now down 50 feet on a stringer from the main vein, which carries silver and cobalt values, will be sunk to 100 feet. The main vein will be developed by a cross cut run from the working shaft at this level. Mr. Cohen expects to develop the property by a system of exploration tunnels. The main tunnel will be 1,500 feet long, extending east from the shaft and with cross tunnels at intervals of 500 feet.

The ore in the original working is wonderfully rich. Fifty pounds taken from the bottom of the open cut and smelted at the Silver Queen, gave 38½ pounds of silver, 940 fine. A 20 ton car of ore is now being sampled by Ledoux & Company. The refining of the nuggets has not been completed but the ore will run between nine and ten thousand ounces silver to the ton or approximately $90,000 to the car. After being sampled by

Ledoux & Company the ore will be shipped to Delora for treatment.

An interim dividend of 4 per cent. on the capital stock, payable July 1st, has been declared. The stock outstanding is $1,750,000.

Montreal River District.

The Gates property, James township, has been sold to a Detroit syndicate. Mr. Tom Fee of Cobalt is now on the property laying out the plans for development work.

Holden Property.

A promising vein of calcite and copper with small stringers of aplite carrying high silver values, has been encountered in a drift at the 90 foot level. This claim is in Tudhope township.

The righteous indignation of the better class of prospectors and miners in the Montreal River district, has been aroused by the exaggerated and inaccurate statements published in the local paper. Apparently no effort has been made by the editor to confirm the truth or even the probability of a greater part of his "news items."

The development of this district will largely depend on the result of this season's prospecting and development and while outside capital is badly needed there is no room for a wild-cat boom or wild-cat methods of advertising. The owners of properties and the prospectors now in the field are beginning the summer's work with quiet confidence that legitimate development of the rich prospects will make a producing camp of the district. Outside capital undoubtedly is needed and should be secured; but it is far more important that legitimate mining men be attracted and induced to undertake the intelligent development of the district in a practical way, and such men are interested and attracted by sane, attractive, and conservative statements. There is plenty of real news. Interesting stories and news items may be had from almost anyone of the hundreds of men who know the country and are working for its best interests.

Temagami.

Active prospecting and development has been started on the Old Abe property situated one mile north of Temagami station. The three forty-acre claims which constitute the holdings of this company, were prospected last summer with very promising results.

ALBERTA.

Coleman.

The miners in the collieries of the International Coal and Coke Company's mines, struck owing to a dispute about pillar drawing. The men have a contract rate for this work, but the company wished to introduce day labor. The men were only idle for two days and resumed work pending the sitting of the District Grievance Committee, when the whole matter will be investigated, and it is thought that it will be finally settled without an arbitration board being asked for.

Frank.

An examination of candidates for Fireboss' certificates was held in this town last week. Six candidates presented themselves for examination. The examination board consisted of the two mine inspectors for the province and one member representing the mine owners and a fourth member representing the miners.

Although practically no work has been done at the mine since Christmas, the outlook for the future is much brighter. The company has been reorganized and Mr. H. Gebo has undertaken the general management of the concern, with Mr. S. McVicar as mine manager, and C. Chesnut as pit boss.

Mr. G. C. Rochfort, book-keeper with the old company, has been elected as secretary-treasurer, with Mr. G. S. Silverman as travelling sales agent.

The old slope east of the town has to be pumped out. This slope has not been worked for a number of years, but it is now intended to reopen it.

A force of men are at work repairing the main tunnel and doing other preliminary work with a view to an immediate resumption of work.

Mr. Gebo has taken a large contract to supply coal to a Spokane firm and at present extensive alterations are being made on the screening plant so that the requirements of the contract can be fulfilled.

Strathcona.

The case of 21 miners versus the Strathcona Coal Company came up in the District Court before his honor, Judge Taylor. Some time ago the company made an agreement with the men after an Arbitration Board under the Lemieux Act had investigated a dispute between the said parties. Since then the company entered into a new agreement for a smaller wage with three of the men on behalf of their fellow-workers without complying with the requirements of the Lemieux Act.

The judge held that the three men who made this new agreement must abide by it, but the agreement was not binding on the other workmen.

The United Mine Workers of America has taken up the question and will appeal from the decision of the judge with respect to the three men. It is also understood that they will enter an action in the Supreme Court against the Strathcona Coal Company for $20,000 damages for violation of their agreement.

Lethbridge.

No. 3 shaft of the Alberta Railway & Irrigation Company does not average more than three days per week. There is very little improvement to be looked for until dealers begin stocking up coal for the fall again.

The new shaft situated a short distance from the town is being rapidly pushed ahead. Mr. Robert Livingstone who has charge of the construction work at this shaft, resigns his position with the company at the end of the current month. Mr. Livingstone has been appointed by the Provincial Government to the position of mine inspector for the Lethbridge and the surrounding districts. Mr. Livingstone, though a comparatively young man, has had a long experience in mining and has worked himself up from the ranks. He has had considerable experience in the States and has been with the Alberta Railway and Irrigation Company here for over seven years. He has also had considerable experience in the Edmonton coal field where he was manager for the Edmonton Standard Coal Company.

BRITISH COLUMBIA.

Phoenix.

The business interests of the Boundary district are in good spirits just now over the resumption of work by the British Columbia Copper Company after their long shut-down. Owing to the fact that the fixed charges in connection with the Copper Company's plant were quite heavy and also owing to the favorable factor, the low cost of production in the Boundary, due to a spirit of friendly rivalry for low costs that has existed among the managers of the big copper producers of the Boundary, the British Columbia Copper Company has found that it is more

economical for them to operate even with copper at its present low price than to remain in idleness. While the British Columbia Copper Company cannot make copper as cheaply as the Granby, yet, they are a close second to that company in cost of production. The Granby can make copper for about 10 cents per pound and with good management the Copper Company should be able to make it for 11 or 11½ cents per pound, this to include cost of selling, etc. The plant of the Copper Company and work at the mines are being got into form as rapidly as good practice warrants and within 25 or 30 days they will be able to ship 2,000 tons of ore per day from the mine and turn out 1,500,000 pounds of blister copper from the smelter. They will then be employing between 400 and 500 men at the mines and 200 men at the smelter. The new 35-drill Rand compressor is receiving the finishing touches and will soon be available for addition to the air supply.

As the British Columbia Copper Company is in a position to treat ore from the Snowshoe mine to advantage and was doing so at the time they closed down last fall, it is stated that the Snowshoe will shortly be opened up by the Consolidated Company and shipments made on a large scale to the British Columbia Copper Company smelter. Should this come about at an early moment, and with the likelihood of the Dominion Copper Company finding it more economical to work than to lie idle, the Boundary district will exhibit some of its old time liveli-



300 ft. level Old Ironsides, Phœnix, B.C.

ness. The plant of the Dominion Copper Company is being kept in readiness for immediate resumption of work but no word has been received by the management from headquarters as to going back to work, so far.

Shipments from the Granby mines for the week ending May 16th amounted to 24,309 tons and their total for the year to date is 402,354 tons. With seven furnaces working at the smelter they treated 22,402 tons of ore which makes the amounted smelted up to date 392,494 tons. Diamond drill prospecting is being continued on the property. During the last four years the Granby Company has drilled 29,117 feet of diamond drill holes in the hill, or over six miles of work. Diamond drilling has been found economical development in the Granby mines and has given good results.

The Crescent mine at Skylark camp shipped a thirty-ton car of ore to the Trail smelter during the week.

The Greenwood prospecting tunnel proposition keeps bobbing up every now and then and it looks as though work might be started. The company has been, or is to be, capitalized for $5,000,000 in $1 shares, which looks a little damp to the cursory observer. The promoters may be able to see their way clear to make a paying proposition out of their tunnel but from the information one can gather it will be more of a speculation as to the encountering of the high grade lodes that may be on its line rather than an industrial enterprise for the economical handling of Phoenix ore.

In the Boundary and all through the Kootenays there are mining propositions that are used as a basis for the sale of stock and intending investors in legitimate mining propositions must make strict inquiry as to the merits of any company they are going to put money into, for the risks with which the best mining ventures are fraught, are hazard enough without banking on luminous but hazy reports from wild-cats and knife-blade ledges of ore, probably of high grade, that cannot be mined at anywhere near a profit, although it may assay into the hundreds.

Rossland.

Prospecting in the South Belt and work on the good showings they have in that district are being executed with some of the zeal and hope of the earlier days of the camp. Mining men are keeping in close touch with work in that part of the camp and if results obtained during the next few months warrant it considerable development, on a larger scale than at present, will be undertaken. The Monday claim has been leased by John Brokenshire and associates, Mr. Brokenshire having sold out his interest in the Blue Bird lease at a good profit. The Monday is near the Blue Bird and a little work on the property may uncover the continuation of the Blue Bird ledge. The Spitzee, which the Le Roi Company had under lease for a while has again been leased and work will be started right away. The Spitzee is having a lot of ups and downs but may surprise even those who think it will prove a good property some of these days.

The shaft of the Centre Star is now down to the fifteenth level, 2,100 feet from the collar. In consequence of the encouraging showings that have been met with at depth in the Star the shaft will be sunk still deeper in the near future. The rich gold ore still continues to be found and mined in the lower levels of the War Eagle and work on the Iron Mask and Idaho portions of the Consolidated Company's property is giving satisfactory results.

The Le Roi, Josie and Giant California mines are prosecuting work with their usual vigor and good results are being obtained for every foot of work done.

The Blue Bird has shipped another 20-ton car of good grade ore to the Trail smelter. The combined output of the camp continues to average 5,000 tons per week and the receipts of ore at Trail smelter run about 6,500 tons per week, including ore from the Snowstorm (Idaho), First Thought (Wash.), North Star, Richmond, Rambler-Cariboo, Vancouver and Reco.

One of the flumes bringing water to the city burst recently and the escaping water carried away the wash and laid bare a hitherto unknown ledge of mineralized matter. One of the miners who appeared on the scene recognized that it might prove of value and staked a claim upon it.

M. R. Galush, managing director of the Jumbo mine, Spokane, states that they will put a small force of men to work on the Jumbo at an early moment, which will be augmented as the showing made warrants. Mr. E. L. Tate, one of the large stockholders in the Cliff mine, which is one of the most promising properties in the camp, is in Rossland from Spokane and says that if the interests in the Cliff can be got into harmony something will be done with that property this season.

Nelson.

The Canada Zinc Smelting Company of Nelson will begin operation June 1st. The capacity of the plant for the present time will be twenty tons per day. The machinery will be elec

trically operated and will require about 1,00 horse power which will be developed from power derived from the high voltage lines of the West Kootenay Power & Light Company.

It is reported that the ore body they have been prospecting for in the Ymir mine has been located, but the management is very quiet about the strike. Spokane men are expected up to examine the Yukon in a few days.

At the Giant mine, near Golden, an up-to-date Elmore oil process of concentration has been installed. It is expected that this improved process will be far ahead of the first plants installed.

The old ledge has been encountered on the Granite Poorman near here. The lessees have been making a good profit from ore taken from a new ledge and the strike now made will prove a good one. The car of ore shipped from the Slocan Sovereign, March 23rd, returned 90 ounces silver and 60 per cent. lead.

It is the general opinion here that the lead bounty will be extended all right, although nothing has been heard as yet regarding the matter. One reason advanced, and a good one, is that there is yet enough of the grant unused to run for a further period of six years, at the rate it was used during the last couple of years.

GENERAL MINING NEWS

NOVA SCOTIA.

Halifax.—The Lake View gold mine, at Waverly, has been sold by Mr. A. A. Hayward, to Mr. J. B. Woodworth, the discoverer of the Nova Scotia Cobalt mine. Mr. Woodworth represents a small syndicate of which Mr. O'Brien of the O'Brien Cobalt mine, is a member. The Lake View is a well-equipped mine. A considerable quantity of high grade gold ore is blocked out and some thousands of feet of development have been finished. It has lain idle for some years.

Mr. W. J. Prisk, formerly manager of the Dominion Antimony mine, West Gore, is now in charge of the Eagle Mining Company's property at Renfrew.

There are rumors of an English syndicate being formed to operate a group of Nova Scotia's gold mines. Definite news has not yet been received, but the concern is reported to be a responsible and large one.

Sydney.—Fire broke out on the evening of May 19th in the pipe shop of the Dominion Iron and Steel plant. The building was destroyed. The estimate loss is small and is covered by insurance.

ONTARIO.

Madoc.—Talc shipments from the Henderson talc mine are to be made within a few days. It is announced that the output of the mine will be largely increased.

Cobalt.—The main shaft of the Nova Scotia mine is down 160. The drifts are in good ore. About 60 men are employed.

The Foster mine has removed a part of its underground force with the intention of devoting more time and energy to prospecting the remainder of its territory. Only a small proportion of the Foster lot has been worked.

The Cobalt Central has leased the Bailey property. An arrangement has been made whereby the Bailey Company will receive 50 per cent. of the net production.

Sault Ste. Marie.—The power house of the Lake Superior Power Company was destroyed by fire on the morning of May 18. The estimated loss is $300,000, fully covered by insurance.

BRITISH COLUMBIA.

Fernie.—John Cattell, a machinist in the employ of the Crow's Nest Pass Coal Company at Coal Creek, was killed on May 6. In some manner he was caught and dragged underneath a mine locomotive. The engine and eight cars passed over him, mangling the body fearfully.

Nelson.—The Queen mine at Salmo was sold on May 4th to an American syndicate. The purchasers are residents of the state of Wisconsin. The mine is to be worked at once. The price paid is reported to be $175,000. Of this $50,000 is to be paid cash down, the remainder in 30 months. The terms of purchase stipulate that work shall be continuous.

Rossland.—The second general meeting of the western branch of the Canadian Mining Institute was held in Rossland on May 14. The morning and afternoon sessions were attended by about fifty members. In the evening a smoker was held at the Rossland Club. Trail, Nelson, Grand Forks, Phoenix, Vancouver, Victoria and Northport were represented. Professors Dresser and Porter of McGill University were present. Mr. A. B. W. Hodges occupied the chair. The local council was increased. A resolution was passed requesting the Provincial Government to make a grant of money towards defraying the expenses of the British delegates who are to visit British Columbia next fall.

On May 15, the visitors were shown through the principal Rossland mines.

Phoenix.—There is rejoicing in Phoenix. The British Columbia Copper Company's mines and smelter are operating again. On May 6, work was started at the Mother Lode mine, Deadwood camp, and at the Emma and Oro Denoro mines, Summit camp. The smelter also is being got ready. The three furnaces will be blown in as soon as the ore bins are full. There is a large supply of coke on hand. The company has a contract for treating the ore from the Consolidated Company's Snowshoe mine. This will mean an addition to the payroll. It is hoped that the smelter will be able to handle about 2,000 tons of ore per day. During the first ten months of 1907, the British Columbia Copper mines shipped 242,788 tons of ore. The individual mines contributed to this total thus:—Mother Lode, 208,321 tons; Emma, 18,274 tons; Oro Denoro, 14,481 tons; B. C. mine, 1,712 tons.

Greenwood.—The plans for the long Greenwood Phoenix tunnel are maturing. Work will be commenced before the first of June. When driven a mile, starting from Greenwood, it will tap seven mining properties, giving natural drainage and doing away with haulage and hoisting.

Victoria.—Mr. W. W. Leach of the Geological Survey, left Victoria for the Bulkley Valley in the Skeena river district. Mr. Leach will be accompanied by a party of six. He will return in October.

Atlin.—The Otter Creek Hydraulic Company will begin washing as early as weather permits. Messrs. Jamieson and Maluin are in charge.

YUKON.

Dawson.—Reports indicate that eighteen dredges will be operated in the Klondike, Forty Mile and Stewart River districts this season. The first electrical conveyor ever installed is to be used by the Goggenheims.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The South Wales and Monmouthshire coal owners have adopted the recommendation of the Royal Commissioners on Mines with respect to establishing rescue stations and definite steps have now been taken to proceed with the necessary building. The first station will be constructed at Aberaman, in the Aberdare valley, where officials and others will be trained in rescue work. The building will be equipped with Fleuss' apparatus and other appliances.

Mr. Richard A. S. Redmayne, M.Sc. F.G.S. has been appointed Chief Inspector of Mines. Mr. Redmayne, after a lengthy practical experience in responsible positions, has been professor of mining at Birmingham University since 1902, and is the author of several books on mining.

Lord Ardwell has given his decision in regard to miners' wages in Scotland to the effect that a reduction of 6¼ per cent. be made on the 1888 basis, which reduces present wages to 81¼ per cent.

FRANCE.

The zinc works of Mortagne are developing rapidly. After working for about two years and a half the production attained 8,500 tonnes in 1907, with six furnaces and 240large retorts per furnace. The total zinc productions for last year was 49,000 tonnes and an increase of a few more thousand tonnes will supply the home demand for metallic zinc.

AUSTRIA-HUNGARY.

The Hungarian coal industry is very active owing to the growing demand and the scarcity of labor has resulted in increased wages and improved housing conditions. New shafts are being put down in several districts and prospecting is being energetically carried on.

RUSSIA.

American capitalists are endeavoring to secure control of the platinum industry of the Urals. Negotiations are on foot for the purchase by American interests of the Tagil factories, the Nizhe Pavdinsk properties of Vorobieff and others.

SOUTH AFRICA.

A Department of Mines and Works has been established in Southern Rhodesia, with Mr. E. W. S. Montague as secretary.

There are now 70 tube-mills in operation in the Transvaal which have largely increased the output. At the Luipaards Vlei Estate mine the duty per stamp per 24 hours is now 9.12 tons.

JAPAN.

The abundance of gold to be found in Satsuma has of late attracted the attention of capitalists. There are altogether 197 gold mines, or gold producing districts, many of which have been worked for a long time by hand digging on a small scale. The yield is roughly estimated at 3,000,000 yen a year. Modern methods are now being introduced including water power electricity for the operation of machinery.

AUSTRALASIA.

An important discovery of nitrate of soda has been made on the Grampas station in the Northern region of South Australia. This mineral is found as in Pern beneath a cap of guano. Samples show 24 to 29 per cent. of nitrate of ammonia.

A Geological Survey bulletin on the Great Fitzroy mine, Queensland, places the quantity of ore yielding gold, copper and silver in sight as over 600,000 tons.

A Sydney capitalist has determined to test the Gulgong district, New South Wales, where there were formerly rich alluvial diggings, for deep mining. He purchased several leases and is installing a plant.

Miners are prospecting the ridges northwest of Puranga station, New South Wales, for opal. Twelve years since opal was extracted in this neighborhood, but operations were not continued.

UNITED STATES.

Shipments of anthracite coal from Pennsylvania during April amounted to 5,987,221 tons, making a total of 20,875,474 tons since January 1st, as against 20,966,063 tons for the corresponding period last year.

The iron ore industry of the Lake Superior iron region continues depressed, and production is much restricted. Both the Chapin and Arragow mines of the United States Steel Sorporation, the two largest producers on the Menominee range, are being worked on half-time. There are scarcely a thousand men on the pay rolls, the normal force being about 1,600.

The large mines of Butte district, Montana, are gradually resuming the usual production, and there are few evidences of depression. Much attention is being given by operators to the reduction of the cost of production, and it is expected that several of the amalgamated properties will this year produce copper at a record low cost. The copper production of Butte for April was 21,530,250 pounds, being the largest since July last, when the output was 27,157,300 pounds.

The Copper River & Northwestern Railroad in Alaska is being pushed to completion. About 1,500 men are working on construction. The road is expected to reach the Catalla coal fields this year, and the Alaska Central, also under construction, will probably tap the Matanuska coal fields next season.

MEXICO.

The American Smelting & Refining Company will shortly blow in their smelter near Chihuahua. They expect to get about 15,000 tons of ore monthly from the Santa Sulalia district.

A strike of rich silver ore in the Bien Venido mine at Boru quillas in the Roncesvalles district, Chihuahua, has arroused great interest. Four tons of the ore netted $4,000. Many locations in the neighborhood have been taken up.

COMPANY REPORTS.

The Report of the Tilt Cove Copper Company, Limited, for the year ended December 31st, 1907:—The report of the Committee of Management, presented to the shareholders at the twentieth ordinary general meeting, held on May 14, at No. 9 Queen street place, London, shows, in the Profit and Loss account, a credit balance of £23,587 13s. 9d.

Copies of the reports and accounts presented by the Cape Copper Company at their last general meeting, embracing a description of the progress and result of their operations on this company's property for the twelve months ending August 31st, 1907, were sent out to each shareholder on the 28th of November, 1907. The Cape Copper Company's Tilt Cove establishment audited accounts for the year ending December 31st, 1907, are appended. They show that the mines made a gross profit of £58,609 11s. 5d., leaving, after charging the account with the rent (representing the interest on the debentures), prospecting

costs, management, etc., a net profit of £51,034 14s. 11d. The balance of profit thus remaining has been dealt with as follows: £25,517 7s. 5d., has been retained by the Cape Copper Company, and £25,517 7s. 6d. has been received by this company as its moiety of profit, as provided for in the agreement with the Cape Copper Company.

Although a profit of £51,034 14s. 11d. is shown on the Establishment account, that result is arrived at after the absorption of £38 2s. 4d., an increase in the amount retained for working capital, and this amount has been added to the capital expenditure on the one side of the account, and to the reserve for depreciation on the other, as heretofore.

Out of the available profit of £27,098 3s. 8d., £1,374 5s. 9d. has been paid in income tax, and interim dividend of 2s. 9d. per share was paid on December 3rd, 1907, and the committee now recommend a final dividend of 2s. 3d. per share, making a total distribution of 5s. per share, or 12½ per cent. for the year, leaving the sum of £3,473 17s. 11d. to be carried forward to the next account.

COMPANY NOTES.

The dividend of the International Coal and Coke Company has been reduced from the annual rate of eight per cent. to five per cent. Dividends were begun on the first day of February, 1907. The directors had hoped to wipe out the outstanding obligation of $200,000 by disposing of treasury stock. The uncertain and disturbed condition of the market made it impossible to do this. Hence the reduction in the dividend rate. The difference is to be applied to the liquidation of the indebtedness. The next quarterly dividend will be at the rate of one and one-quarter per cent.

The annual meeting of the Silver Leaf Mining Company, Limited, will be held at McConkey's, at 10 a.m. on June 2nd.

STATISTICS AND RETURNS.

The output of the Crow's Nest Pass collieries for the week ending May 22 was 10,950 tons, or a daily average of 1,825 tons.

The Crow's Nest Pass Coal Company, Limited, report the output of the collieries for the week ending May 15th, as 19,385 tons, a daily average of 3,231 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1st to date:

	Week end. May 16.	Since Jan. 1.
Buffalo	.....	563,810
Coniagas	.....	830,910
Cobalt Lake	65,845	246,455
Crown Reserve	.....	40,000
Cobalt Central	49,200	156,380
City of Cobalt	.....	338,600
Drummond	.....	92,340
Foster	.....	238,400
Kerr Lake	61,960	392,270
King Edward	.....	127,240
La Rose	80,000	1,981,652
McKinley	60,000	1,243,900
Nipissing	133,020	1,316,920
Nova Scotia	106,765	227,555
Nancy Helen	.....	140,420
O'Brien	63,800	1,826,370
Right of Way	60,500	181,180
Provincial	.....	143,210
Standard	.....	39,730
Silver Queen	.....	524,200
Silver Cliff	.....	52,000
Silver Leaf	.....	132,800
Townsite	.....	85,100
Temiskaming & H. B.	60,000	599,000
Temiskaming	88,140	325,390
Trethewey	.....	679,916
Watts	66,000	180,430

The total shipments for the week were 895,230 pounds, or 447 tons. The total shipments from January 1st to date are 12,304,448 pounds, or 6,152 tons.

Following are the weekly shipments from Cobalt camp, and those from January 1st, to date:

	Week end. May 9.	Since Jan. 1.
Buffalo	46,290	563,810
Foster	69,800	238,400
La Rose	40,000	1,901,652
McKinley	60,000	1,183,900
Nipissing	122,240	1,230,870
O'Brien	127,500	1,763,070
Right of Way	60,470	120,680

The total shipments for the week were 526,300 pounds, or 263 tons.

The coal shipments of the Nova Scotia Steel and Coal Company for the four months are as follows:

Shipments, April, 1908	38,000
Shipments, April, 1907	33,450
Increase, April, 1908.	4,550
Shipments, 4 months, 1908	155,737
Shipments, 4 months, 1907	120,279
Increase, 4 months, 1908	35,458

BRITISH COLUMBIA SHIPMENTS.

Following are the shipments for the week ended May 2nd, and year to date:

Boundary shipments—

	Week	Year
Granby	19,942	354,472
Other mines	.....	462
Total	19,942	354,934

Rossland shipments—

Total	6,076	96,847

Slocan Kootenay shipments—

Total	1,086	37,834

The total shipments for the past week were 27,104 and for the year to date 489,615 tons.

Granby Smelter receipts—

Granby	19,942	354,472

Consolidated Company's receipts—

Total	5,006	93,008

Le Roi Smelter receipts—

Total	2,359	28,776

The total receipts at the various smelters for the past week were 27,307 tons and for the year to date 381,986 tons.

Following are the shipments for the week ended May 9th, and the year to date:

	Week	Year
Boundary shipments—		
Total	23,203	278,137
Rosland shipments—		
Total	5,589	102,436
Slocan-Kootenay shipments—		
Total	1,110	38,944

The total shipments for the past week were 29,902 and for the year to date 519,517 tons.

Granby Smelter receipts—		
Granby	23,173	377,645
Consolidated Company's receipts—		
Total	6,308	99,316
Le Roi Smelter receipts—		
Total	1,346	30,122

The total receipts at the various smelters for the past week were 30,827 tons and for the year to date 512,813 tons.

Following are the shipments for the week ending May 16th and the year to date:

	Week	Year
Boundary shipments—		
Mine		
Granby	24,309	401,954
Other mines		492
Total	24,309	402,446
Rossland shipments—		
Centre Star	3,744	65,733
Le Roi	1,518	29,949
Le Roi No. 2	508	12,024
Bluebird	53	53
Other mines		500
Total	5,823	108,259
Slocan-Kootenay shipments—		
St. Eugene	251	8,649
Whitewater, milled	280	5,460
Poorman, milled	250	4,100
Queen, milled	185	3,505
Second Relief, milled	145	1,955
North Star	30	1,162
Richmond Eureka	86	635
Rambler Cariboo	43	545
Vancouver	47	501
Ruby	40	181
Slocan Star	65	128
Granite	31	100
Other mines		13,476
Total	1,453	40,397

The total shipments for the past week were 31,585 and for the year to date 551,102 tons.

Granby smelter receipts—		
Granby	24,309	401,954
Consolidated Company's receipts—		
Total	5,801	105,117
Le Roi Smelter receipts—		
Le Roi	1,518	29,929
First Thought	313	1,709
Other mines		235
Total	1,841	31,953

The total receipts at the various smelters for the past week were 31,951 tons and for the year to date 544,754 tons.

Messrs. L. Vogelstein and Company of New York, report the following figures of German consumption of foreign copper for the period January to March, 1908:—

	Tons.
Imports of copper	44,914
Exports of copper	2,084
Consumption of copper	42,830

Of the above quantity 41,999 tons were imported from the United States. The consumption for the same period in 1907 was 24,393 tons.

MARKET REPORTS.

Coke.

May 22—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt, $1.55 to $1.65.
Foundry coke, prompt, $2.10 to $2.25.

Pig Iron.

May 22, Pittsburg—
No. 2 foundry, $15.40 to $15.65.
Bessemer, $16.90 to $17.15.
Basic, $15.90 to $16.15.
Malleable, $15.90 to $16.40.
Southern No. 2, $16.40 to $16.90.

Other Metals.

May 22—
Tin, Straits, 29.55 cents.
Copper, prime lake, 13 cents.
Lake, arsenical brands, 12.85 to 12.95 cents.
Electrolytic copper, 12.85 to 12.90 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.35 cents.
Spelter, 4.65 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.75 cents.
Aluminium, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $23 to $25.50 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $45 per 75 pound flask.

Silver Prices.

	New York. Cents.	London. Pence.
May 11	52½	24 3-16
May 12	52¼	24 1-16
May 13	52⅜	24⅛
May 14	52⅜	24¼
May 15	52½	24 3-16
May 16	52⅝	24¼
May 18	52⅞	24⅜
May 19	52⅞	24⅜
May 20	53⅛	24½
May 21	53½	24 11-16
May 22	53⅜	24 13-16
May 23	53	24 7-16

MARKET NOTES.

Steel prices are not to be reduced. The manufacturers have agreed to sustain the prices now current.

Of late the copper market has strengthened materially. American buying has induced renewed activity in Europe. Apparently there is little doubt that the tide has turned. Orders are being placed rapidly and the whole situation has brightened

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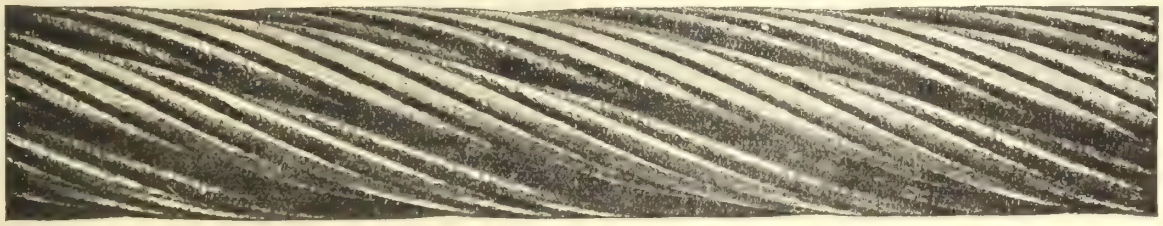


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has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

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W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

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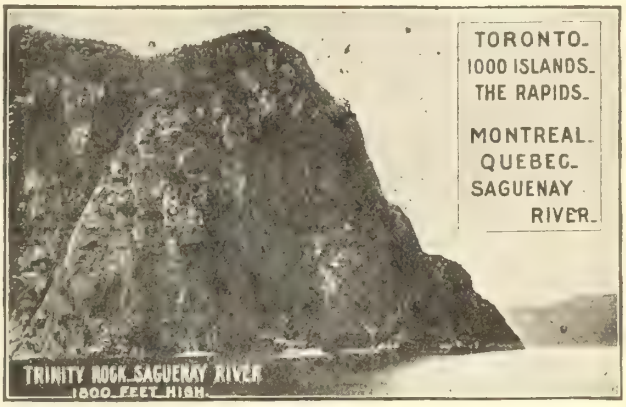
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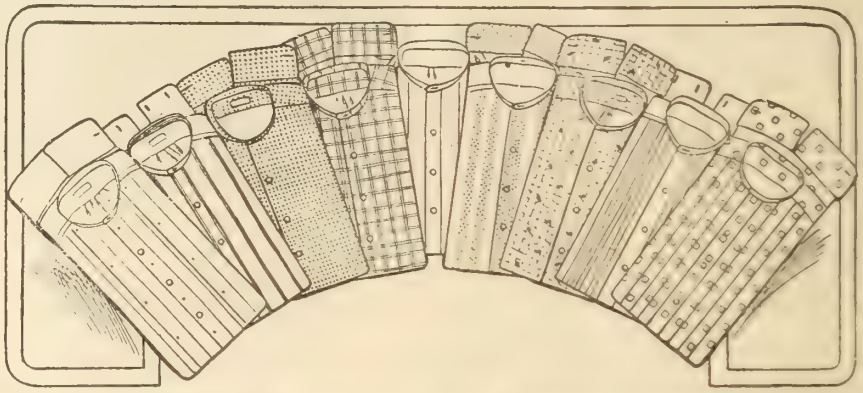
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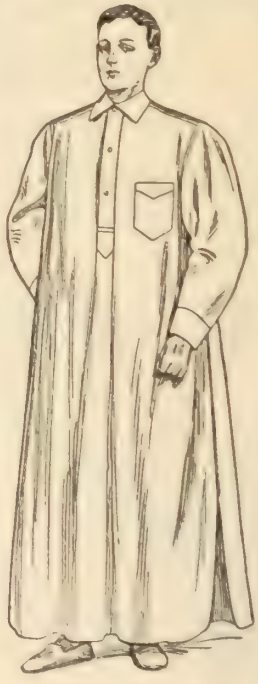
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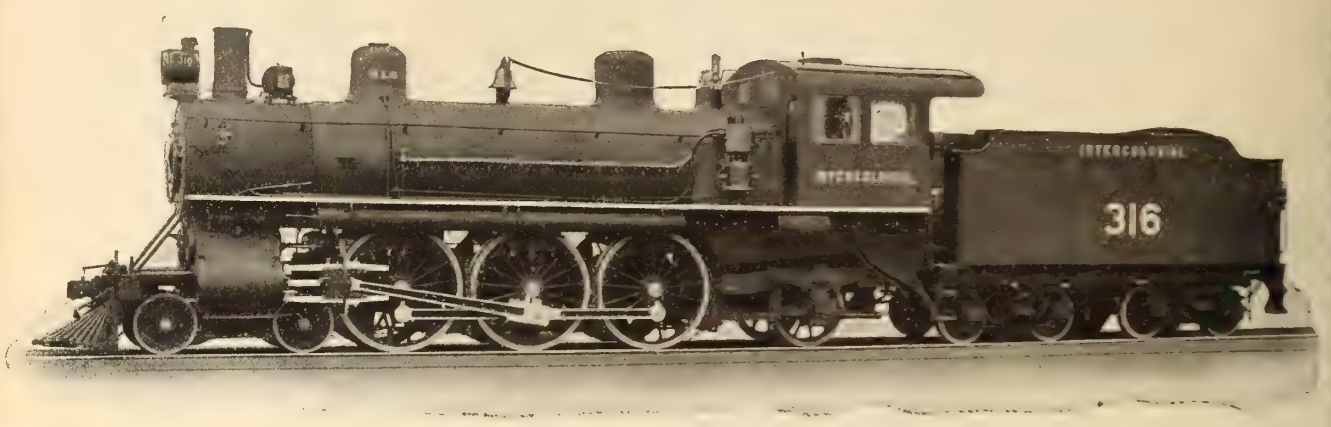
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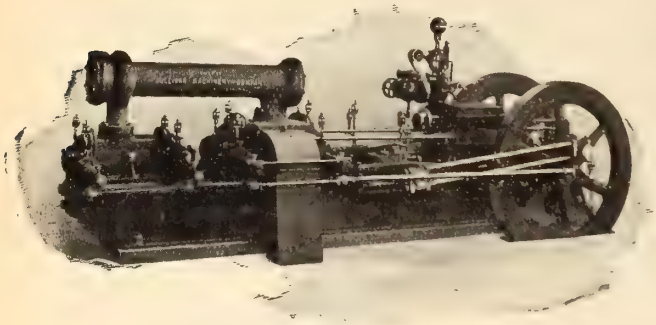
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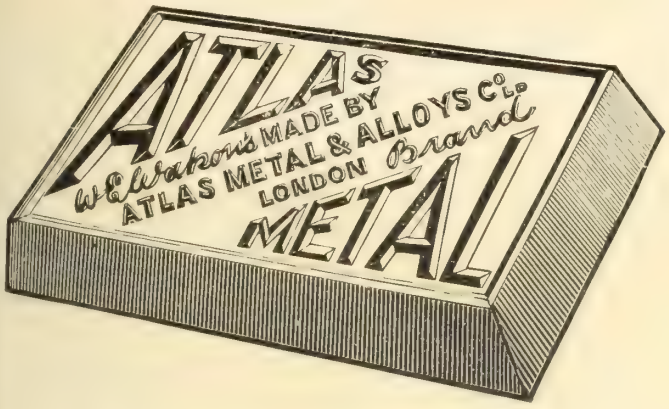
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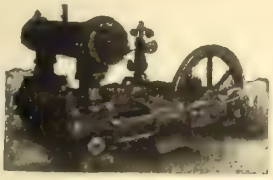
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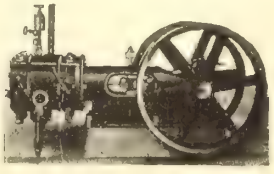
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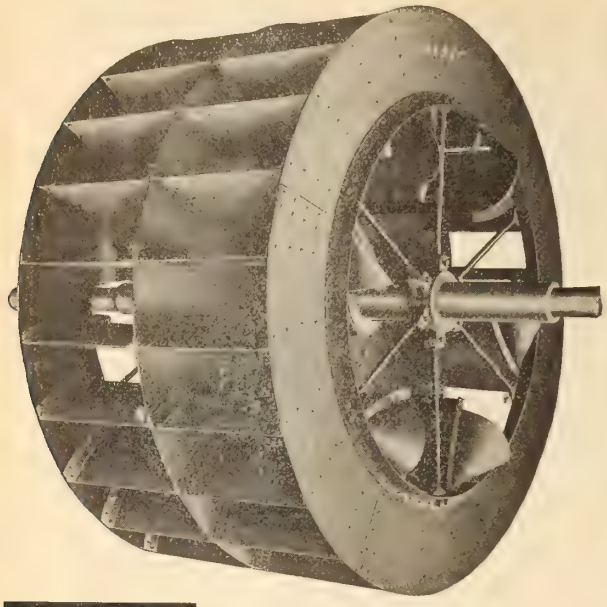
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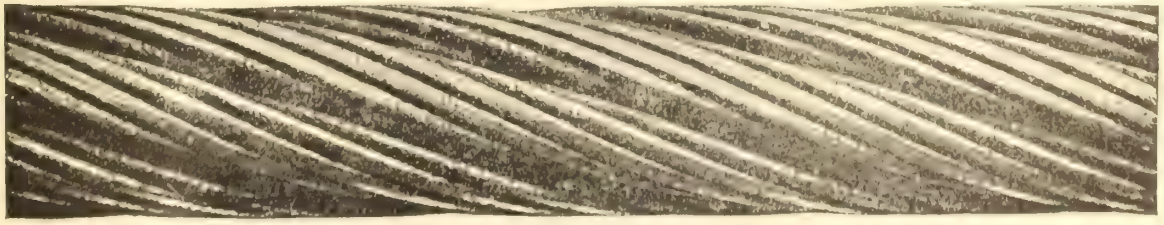


Illustration of **Winding Rope**, 240 fms. long x 3½ circ. Galvanized Special Improved Patent Steel, Compound Make, supplied to Kinneil Collieries, Bo'ness, Scot., which gave a record life of 6 years and 2 months. Showing condition when taken off.

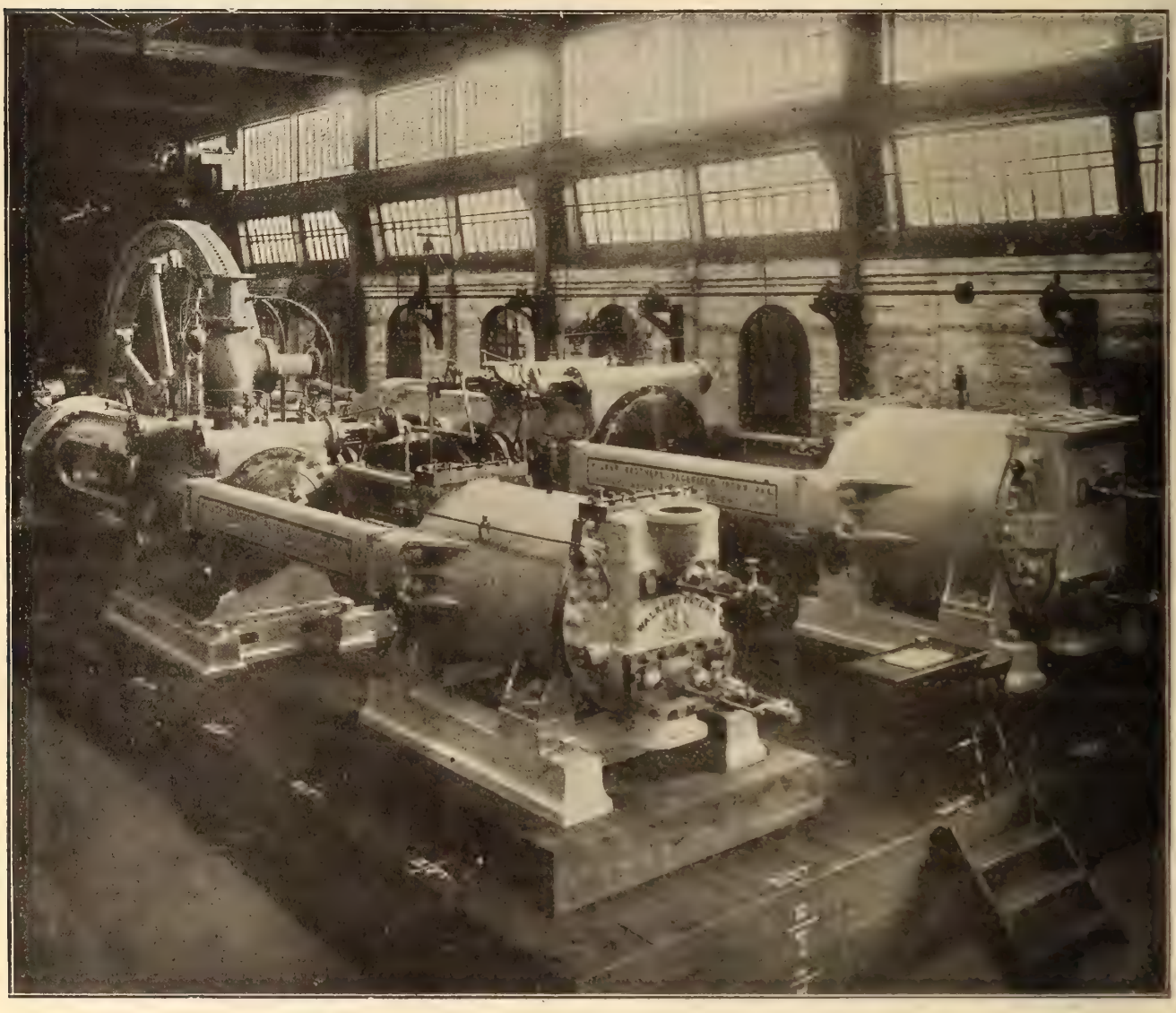
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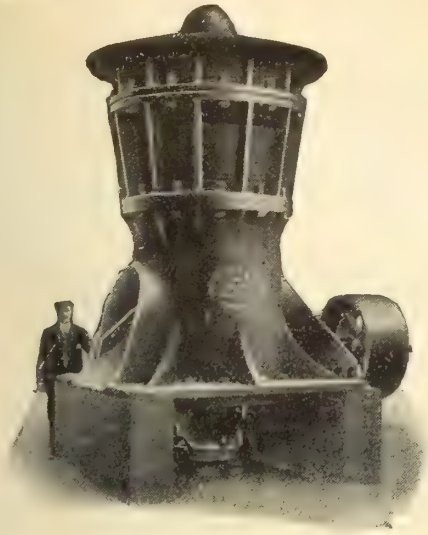
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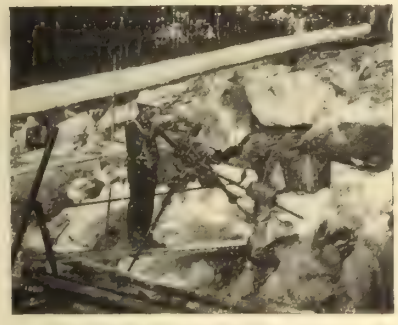
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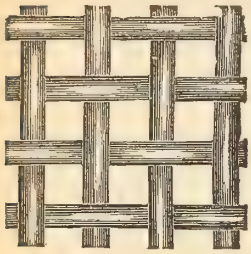
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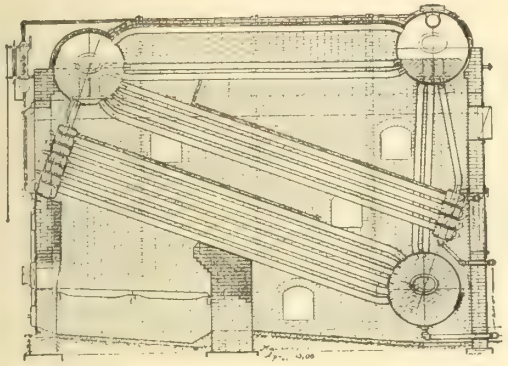
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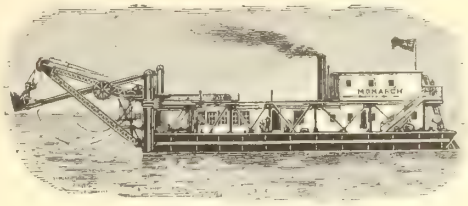
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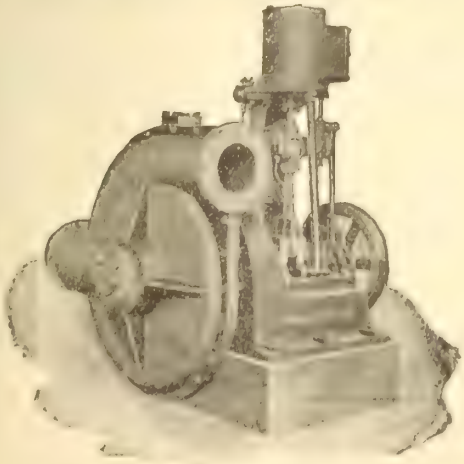
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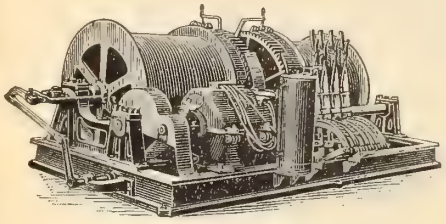
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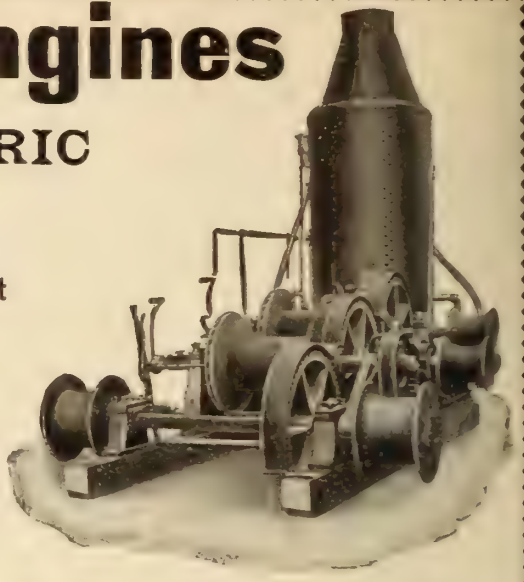
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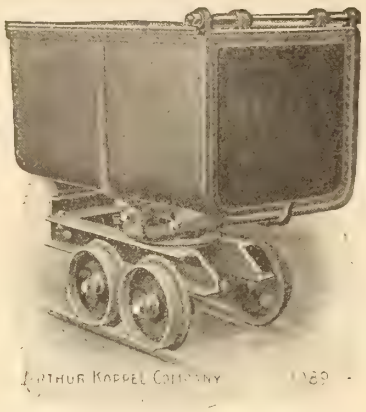
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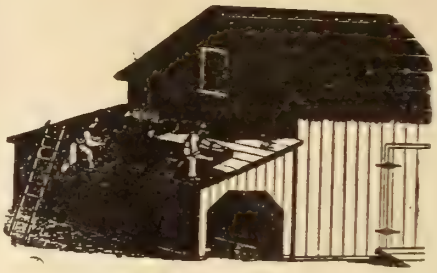


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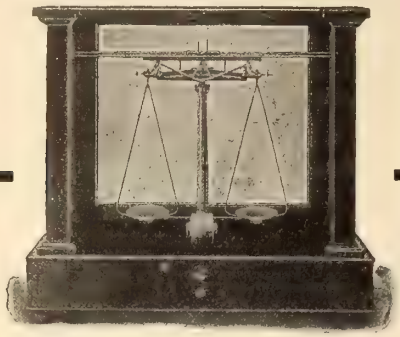
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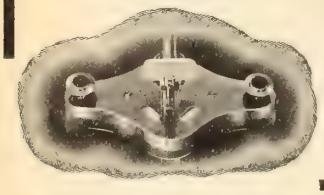
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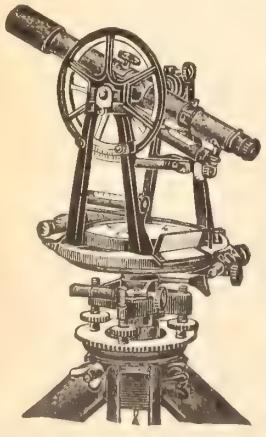
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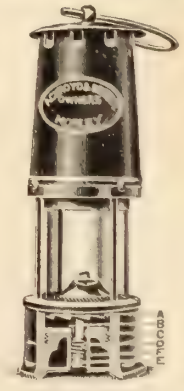
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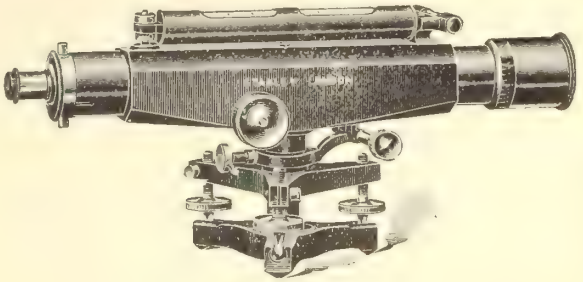
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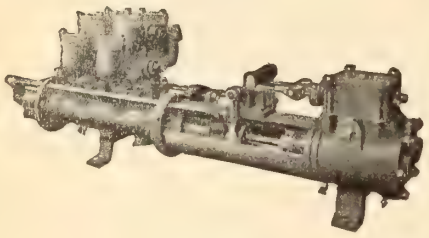
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO and MONTREAL, June 15, 1908 No. 12

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of THE CANADIAN MINING JOURNAL were printed and distributed, or an average of 3,822 per issue.

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REVIEW.

Official returns indicate a pronounced improvement in industrial conditions. The demand for labor became active in April and has continued to grow. In the Northwest Provinces seeding was completed at least three weeks earlier than was possible last year. Everywhere, east and west, the weather conditions appear to give promise of good crops Orchards are flourishing, trade is being pushed on a large scale, and a general tone of optimism prevails.

Directly and indirectly this favorable state of affairs will react upon mining. Collieries will be taxed to their limit to supply regular demands. The Western coal mines, a portion of whose product is consigned to the smelters of Southeastern British Columbia, will have no easy task in keeping pace with these requirements now that smelting operations have been resumed.

The extension of the lead bounty, the resumption of dividends on Granby, the admission of zinc-sulphide ores into the United States free of duty, the establishment of a zinc smelter, are incidental, but important circumstances. Along with these, the activity of the important metalliferous mines of Southeastern British Columbia is distinctly encouraging.

Prospecting and mining were never more extensively carried on in Ontario than at present. From Wabigoon and the surrounding districts come reports of a revival of gold mining. The Sudbury region is normally active. Cobalt is shipping increasing quantities of ore. The Montreal River and Lorrain regions are being developed as rapidly as circumstances will permit, and the adjoining portions of Quebec are coming in for a fair share of attention. The iron industry of Ontario, while it is by no means dormant, is not receiving the same impetus. As an essential and basic industry it now calls for more notice from the powers that be. Graphite and asbestos mining in Quebec are flourishing.

Nova Scotia's coal trade will presumably be larger than in previous years. At Sydney and Sydney Mines, the Dominion Steel and the Nova Scotia blast furnaces are in steady operation. The pig iron output of the latter company for May exceeded that of any similar period in its history.

A cursory survey of the whole Dominion convinces the observer that healthy and constant progress is being made.

Nothing will contribute more largely towards prosperity than an unshaken belief in our high destiny as a nation. The status of no industry warrants that belief to a greater degree than that of the mining industry.

LA ROSE FLOTATION.

Comment is called for on the launching of La Rose Consolidated. For many months street rumors have been current to the effect that this syndicate or that syndicate was about to purchase the famous mine from which the new company takes its name. A singular feature connected with La Rose mine is that some dozens of promoters claim to have been within an ace of handling it. All of these gentlemen may be speaking with an honest inward conviction of what they could have done, but the fact remains that they accomplished nothing.

Meanwhile a $6,500,000 consolidation has been launched upon a rather unreceptive market. At date of writing only very light transactions have been recorded in New York and Toronto, and the stock is yet selling below par.

The times have changed. Had these properties been offered to the public a year ago there is no doubt that the stock would have been eagerly taken up. But time also has changed in respect of capitalization. Twelve months ago such a consolidation would have been organized at twice or thrice the present nominal capital.

La Rose mine is known to be rich. Its ore reserves are thought to be practically untouched. It is fairly well equipped with machinery. La Rose extension has no market value, beyond the consideration that it adjoins La Rose. It is totally undeveloped.

The University, for which a large price was originally paid, is an equipped and fairly well developed mine.

On the Violet a shaft has been sunk 150 feet and a small amount of drifting performed. Its value is unproved

The Fisher-Eplett claims and the Silver Hill group add little positive value to the company's holdings. The Princess also may be relegated to a position only slightly better than the last named properties.

Hence the future of the venture will be the future of La Rose mine, as a mine, and not as a gaudy bait. It follows that the public have a right to full information as to what they are buying. If La Rose mine is as rich as it is reported to be, there is no need of resorting to the ordinary stock-jobbers' expedient of publishing sensational advertisements and impossible news items. If there is something to hide the stock should be left severely alone. If there is nothing to hide, a mining engineer's report should at once be made public.

This is the more desirable, as it is almost unbelievable that the owners of La Rose do not intend to work their mine on its own merits for themselves. In fact this item is the fly in the ointment.

If as a close corporation La Rose has not been a success, what guarantee is there to the investing public that, diluted with unimproved property and handled by market manipulators, the mine will pay dividends?

One conclusion is inevitable. The mine or mines must be placed under the supervision of a general manager, who not only must be a mining man of ripe experience, but must be so situated as to have an absolutely free hand. Also he must be, in character and attainments, a man in whom the public has unreserved confidence. Indeed, in a sense, this official is required as the representative of the public.

Of the present directorate's ability to make a success of the new venture there is much cause to be doubtful.

LEAD BOUNTIES.

The Hon. W. S. Fielding, Minister of Finance, has given notice of a resolution extending the period under which bounties on lead will hold good. The extension provided for covers five years, from June 30th, 1908.

The Act in force since June 30th, 1903, made provision for regulating the bounties by the standard price of pig lead in London. Whenever the London price rose to £12 10s. per long ton, a gradual diminution of bounties ensued automatically. When lead sold for £16 per ton, no bounty was paid. This fixed the minimum selling price of £16 for the producer.

Under the provisions of the new bill the standard price is fixed at £14 10s., beyond which point the bounties decreases regularly. Further, the payment of bounties in any fiscal year, until June 30th, 1913, is no longer to be limited to $500,000. But the total of all sums paid under both Acts must not exceed $2,500,000.

The subject of lead bounties was discussed at the Ottawa meeting of the Canadian Mining Institute. A resolution was then passed strongly urging the Government to renew the bounty which was to have expired on June 30th next. One of the chief arguments in favor of renewal lay in the fact that although $2,500,000 had been appropriated for bounties extending over the first term of five years, 1903 to 1908, only about $700,000 of this had been actually paid out. The comparatively low price of lead at which the bounty became inoperative and the steadiness of the lead market at a figure but slightly in advance of the point at which bounties vanished, combined to discourage British Columbian producers.

It was recognized that either the production of lead must cease or some stimulant be applied. It is claimed that when lead is selling in London at £18 per long ton the British Columbian producers need no help. When the price drops below this point they are to be assisted on an increasing scale until, when the metal sells below £14 10s., they received the maximum bounty. In other words, the fixed minimum price guaranteed to Canadian producers is now £18 instead of £16 as heretofore At least this is the figure specified in the memorial submitted by the Canadian Mining Institute. Despatches received from Ottawa are not entirely clear upon this point, but we take it that it is the only reasonable interpretation.

Our Western lead miners are forced to contend against a United States import duty of 2⅛ cents per pound on pig lead and a correspondingly heavy duty on lead ores. The expense in reaching other markets is high and, until the industry has attained greater proportions and firmer roots, help is imperative.

STANDARDIZATION.

Carrying out their praiseworthy work of standardization, the sectional committees of the Institution of Mining and Metallurgy are issuing circulars, on each of which pertinent and comprehensive questions are printed. Space is left for answers and members of the Institution are requested to full in and return the forms.

Two of these forms have reached us recently. The first is that prepared by Sectional Committee "B." The letter accompanying the circular explains that Committee "B" has to do with recommending methods of reporting the results of assays and of metallurgical and other trials, of which assays form an essential part. The necessity of specifying if "fire" or "wet" methods have been used, or if the sample was assayed in an "air dried" or artificially desiccated condition, is alluded to.

Already six standard definitions have been accepted. The word "ton" is taken as representing a weight of 2,000 lb. avoirdupois (29, 166.6 oz. troy), and fractions of a ton are to be expressed in decimals, not in "hundred-weights" and "quarters." Gold and silver returns are to be written in terms of "fine gold" and "fine silver," and the word "bullion" no longer used in this connection. The return of the gold contents of ores, money value as well as weights, are to be reported. A value for the troy ounce of 85 shillings (or $20.67) is to be taken as a constant. The centigrade thermometric scale is recommended for universal use. The word "gallon" shall represent the Imperial gallon measure of 10 lb. of water. For sieving tests the I. M. M. Standard sieves shall be used. Otherwise the widths of the apertures shall be stated.

Sectional Commitee "E" was appointed to take up the standardization of mine accounts and cost sheets from the mining engineer's point of view. Definitions of capital expenditure, both before and after the producing stage has been reached, are asked for. In the same way expenditure on development and shaft sinking is the subject of set questions. Other and most important items included in the schedule of interrogations are contingent funds, depreciation, segregation of working costs, ore in reserve or in dumps, etc., etc.

It would be difficult to estimate the importance of this effort towards standardization, especially in reference to mine accounts. A clear understanding of the exact meaning of the term "capital expenditure" would be of great use both to the engineer and to the investor. This and many other terms are used loosely, often with mischievous effect. Precise definitions, arrived at by means of circulars such as those before us, will help to establish sound relations between the investor, the engineer, the accountant and the assayer.

OBSTRUCTION.

This is the summer of our discontent. What with two Provincial elections just over and done with, a Federal election imminent, and a Presidential election approaching rapidly in the small Republic to our south, the air is electric with painful recriminations and adjectival amenities.

Possibly the very tenseness of the situation has got upon our nerves. But, whatever the cause, we cannot refrain from treading upon ground that we ordinarily take the greatest pains to avoid.

In our last issue we expressed our unvarnished opinion of the attitude of part of the public press towards the mining administration of Ontario. In doing this we, in no sense, became the apologists of the present Provincial Government. To be quite frank, we have often had cause to deplore the unmeasured praise poured upon the local Ministry's unwilling heads by newspapers of their own political color. So far as the Department of Mines is concerned, neither unqualified censure nor unstinted praise is deserved, nor should either be offered by any respectable journal.

But we wish just now to refer to certain pains and penalties that the mining community is suffering, because of the political situation at Ottawa

The Geological Survey Branch of the Dominion Department of Mines begins early in each year formulating plans for the summer's work. According to press despatches, about fourteen parties were to have been sent out west this spring. The exploitation and development of Canada's mineral resources are dependent upon the works of these parties to a degree hardly realized by the public. To ensure efficiency and economy the parties, especially those whose instructions carry them far afield, must have all in readiness early in the spring. The principal outlay of the appropriation is made in the purchase of tents, canoes, supplies, and transportation. Therefore the bulk of the appropriation is needed early in the year.

It is a sad fact that the only lethal weapon in the possession of his Majesty's loyal Opposition at Ottawa is that double-bladed axe *obstruction*. By the exercise of certain prerogatives all votes of supplies can be blocked. And at present they are being blocked.

Whether this is "good" politics, "bad" politics, heroism, or original sin, we stay not to enquire. But we linger to notice that the work of the Geological Survey has suffered delay already and may be altogether hindered if the deadlock is continued.

Hence we most respectfully (but insistently) submit that the interests of the mining industry (an industry peculiarly susceptible to chills, fevers, and vapours) must not be sacrificed even for the good of a fighting Opposition.

All of which emphasizes strongly the fact that important branches of the public service, especially the two branches of the Department of Mines, should be removed entirely from the zone of political disturbance.

THE SUMMER EXCURSION.

On another page we present the provisional programme prepared by the Secretary of the Canadian Mining Institute for the visit of the British and European delegates next August. It is the wish of the committee appointed by the Council of the Institute that the programme be made final as soon as practicable. Hence members of the Institute and others interested in the event will do well to communicate with the Secretary at once if they have changes to suggest. The programme is submitted for criticism, but time is limited and preparations must be completed at the earliest possible moment.

By the courtesy of the Commissioners of the Toronto National Exhibition, a luncheon will be tendered the visitors on September 4th. To accentuate the occasion further, space has been reserved for a strong exhibit of mineral specimens, metallurgical products, and mining machinery. Intending exhibitors should write to Dr. Orr, whose office is in the City Hall, Toronto.

IS THIS A WORLD'S RECORD?

On May 14th, Nos. 2 and 9 collieries of the Dominion Coal Company, Glace Bay, N.S., recorded a coal output of 5,100 tons, from one shaft, in one day. This, we believe (subject to correction), is a world's record. We believe also that these figures will have been exceeded before we have sent this number of "The Canadian Mining Journal" to press.

Such records, unlike the high water marks of one day's production of pig iron from one stack, are authentic and indisputable. A blast furnace can be so handled as to be left with a full crucible on change of shift. The enormous daily outputs of American stacks are often obtained in this way But the amount of coal actually hoisted to the surface from one shaft can be taken as a true measure of work done.

AN APOLOGY.

Our last issue contained a tabulated account of a hammer drill trial conducted in Cobalt some weeks ago. This account was forwarded by Mr. A. A. Cole, mining engineer of the T. & N. O. Commission. It was Mr. Cole's express wish that this should be published without comment. Through an entire inadvertence a note was appended commenting upon one of the drills. Mr. Cole was naturally not responsible for this.

Our prompt apology is due Mr. Cole. Through his energy and courtesy we have been provided with much valuable information. We heartily regret that this mistake occurred.

DISCOVERY.

Dr. R. W. Raymond contributes to this issue of "The Canadian Mining Journal" an article that will be welcomed by all Canadians interested in mining.

The importance to be placed upon the discovery of valuable mineral "in situ" is the point discussed by Dr. Raymond. It will be noticed that the distinguished writer assumes a position that is constructively critical. Existing evils, he says in effect, may be much more tolerable than ill-considered change.

Dr. Raymond's utterances are always worthy of respectful attention and consideration. His long experience, his keenly analytical mind, and the unique advantages that his official position as Secretary of the American Institute of Mining Engineers affords him, contribute to lend value to his pronouncements.

No better beginning than this could be wished for a general and profitable discussion of Privincial mining laws. We shall be pleased to hear from our readers.

Editorial Notes.

The Mining Society of Nova Scotia has issued an invitation to the Canadian Mining Institute and the expected British delegates to visit Sydney in August next as the guests of the Mining Society of Nova Scotia. The invitation has been accepted. The Mining Society of Nova Scotia will take full charge of the excursion on its arrival at Sydney and arrange all the details for the entertainment of the guests. This is tantamount to a statement that the visit will be an unequivocal success.

Litigation over mining troubles brings to light the amazing ignorance of the legal fraternity as regards the commonest technicalities of the mining profession. More often than not a learned judge will listen respectfully to a harangue from a discredited "expert," and will fail to be impressed by the carefully prepared statement of a qualified mining engineer. Mining jurisprudence is a much-neglected subject in Canada. The sooner this is recognized the better. Very little study would put an intelligent lawyer in a position to discriminate between the wordy "expert" and the genuine mining man.

DISCOVERY BEFORE LOCATION.

Written for The Canadian Mining Journal by Dr. R. W. Raymond.

The law of the United States concerning the sale of mineral lands differs from that of Ontario in many respects. With us, a solid lode or placer location made on the public domain withdraws the located tract from that domain, and rests in the locator a possessory title, indefinitely continued so long as certain conditions of annual work are fulfilled, good against any subsequent claimant, and transformable, upon certain conditions and proceedings, into a fee simple, at the option of the locator or his grantee. To make the original location valid, however, it must be based upon the discovery of a mineral deposit within its boundaries. The complications and doubts introduced into the value of the title ultimately granted by the United States patent by the grant (and corresponding reservation) of "extralateral" rights must not be here considered. Apart from these, the whole purpose of the United States law appears to be to encourage the exploration and exploitation of the public mineral land, and the complete transfer to private owners, on easy terms, of the title of the United States, without reservation of royalty, or subsequent control of mining operations.

In view of this liberal policy, the requirement of a "discovery," as the basis of the possessory title, was included in the law, with the view of preventing the location and appropriation of mineral land by those who had not discovered valuable mineral deposits therein. But this provision has done little good and some harm, for the following reasons:

1. The fact and the value of the initial discovery is not authoritatively determined at the time. The fact of the location creates a legal presumption of the discovery, which must be overthrown by evidence to the contrary.

2. A subsequent discovery made by the locator before other claimants have intervened, may correct the lack of a valid discovery before location.

3. Our courts have held in some cases that signs of a mineral deposit sufficient to warrant mining exploration, though not presenting at first proofs of actual value, are sufficient basis for a location.

As I have elsewhere declared, I think that the requirement, under the circumstances of the preliminary discovery of a mineral deposit, is not only unnecessary, but harmful. So long as the possessory title depends upon annual work, upon the cessation of which the tract reverts at once to the public domain, this condition should sufficiently protect the United States against the schemes of those who would hold land without developing its value. Even if the location of land not containing known mineral deposits of value should come forward as purchasers, and ask for a patent conveying full title, I cannot see what harm would come from granting their request. The declared policy of the United States being to sell its mineral land at $5 per acre to any citizen desiring to buy it, after spending a certain sum upon a tract of a certain size, and paying the expense of surveying, advertizing, etc., I do not understand why the Government should say "I will sell you this land at this price, if you have proved it to be worth a good deal more; but if it has never been shown to have any value at all, you cannot buy it."

I could understand this policy, if the United States made any difference in the price according to the known value of the land. But that is not the case. A locator of about 20 acres can work on his location, without buying it, until he has shown it to be worth a million dollars. But that makes no difference to the government. He buys it for $100, just the same. But if it is and has always been worthless, he cannot buy it at any price! The natural result of such a policy would be to leave the public mineral domain like a blanket full of holes, the portions showing mineral value on the surface having been located and appropiated, and the rest being left on the hands of the government. That such a result has not yet become evident, is due to the extreme liberality with which the requirement of a preliminary discovery has been construed and enforced—a liberality so loose that I am inclined to think it has practically nullified the requirement, except in certain cases, where it is appealed to as a technicality, to facilitate litigation. The evils, dangers, and abuses which this provision was expected to prevent can be better prevented in other ways. Meanwhile, so long as our government desires to sell and get rid of its public mineral land, its policy should obviously be to encourage as far as possible the exploration and sale of those which are apparently worthless.

Above all, it is wisdom as well as justice to make all titles definite and indefeasable from the beginning, and not to leave them dependent upon subsequent developments or opinions. Whatever be the initial requirement, its performance should be certified and recognized at the outset, beyond any later reconsideration, except in case of alleged fraud. It is both an outrage upon individual adventurers and a curse to the mining industry of any country, that the laws should permit the uprooting of mining titles upon such vague pretexts as the nature and value of the original "discovery," long after the innocent grantees of the original locator have entered into bona fide possession and risked their money in bona fide exploration and exploitation.

How far the foregoing considerations may be pertinent to the present mining law of Ontario, I will not here undertake to inquire. According to my impression, the provision of "inspection for discovery" was introduced into that law for the purpose of preventing "blanketing"—i.e. the control of large areas by individuals or companies. This is by no means an unmitigated evil. While it may be thought necessary to appease, by disposing of mineral lands in small parcels, the popular clamor raised by prospectors and small promoters, the final result in any premanently productive mining region is sure to be the consolidation of properties into aggregates sufficiently large to warrant the investment of adequate capital for regular and long continued operations. The right to sell is part of ownership; and to grant a small tract to an individual without leaving him free to sell it is not to grant it at all. If he could sell it to a "capitalist," he wouldn't desire it for himself. And so it comes to pass everywhere that capital ultimately gets hold of mining properties big enough to be successfully worked. Whether it is worth while in the long run to make the process so difficult and so dear that capital can not afford the risk of it, is a serious question, on both sides of which much might be said. Meanwhile, I must frankly say

that I do not think the requirement of a discovery is the best way to reach the objects, even of the advocates of that provision. Yet the change of a system in one particular may involve many complications in other particulars; and, since I do not now mean to propose a new mining law for Ontario, I must not be understood as definitely advocating a specified change of that law in one feature only.

BREATHING APPARATUS FOR USE IN MINES.

By Professor Leonard Hill.

Section II. of a paper read before the British Federated Society of Mining Students:

The Fleuss-Siebe Gorman dress of to-day is the perfected form of the apparatus which Mr. Fleuss exhibited in 1880 to the Institute of Engineers of South Wales, and with which, in a form modified for use under water, he saved the Severn Tunnel from flooding. (Trans. Vol. XIII. p.p. 180 and 330.)

"On arriving at the Tunnel Works with his diving apparatus, he went down the shaft and some distance along the subway, but as he had never been underground before, and everything was strange to him, he could not penetrate as far as the door, which had been left open by the men when the spring was struck, and on returning to the surface he said he would go down again if they would allow him to make a second attempt. The diver (Lambert), however, then offered to go down in his dress and apparatus, and, after explaining to him the mode of using it, he did so. The diver had to cross over two trams which had been left on the road, remove some metals which were jammed in the door, close two sluices, and shut the door, all of which he successfully acomplished in about one hour and a half. The depth of the shaft was about 210 feet, in which there was about 39 feet of water when he descended, and he had to travel along the submerged subway from the bottom of the shaft and back again."

Subsequently to this the original Fleuss apparatus was used "for conducting some of the most dangerous of the exploration work at Seaham Colliery, after the fire which succeeded the unfortunate explosion which took place at that colliery in 1881." (S. Wales Institute of Engineers Trans XII., p. 575.)

Mr. H. H. Hedley, who made the report to the same Institute, says:

"The novelty of the apparatus and the principle on which it depended, which at first sight would seem obscure to any but a chemist or physiologist, might lead to the supposition that there would arise some difficulty in its ready use by uneducated or unskilled hands, but the result shows that these fears were groundless, and that there was no practical difficulty in its application. The men were enabled, by using the breather and Fleuss lamp, to penetrate into the workings, which were filled with gas (fire damp), to a considerable distance—in one instance upwards of 300 yards in advance of the bratticed air—and were able to report as to the state of roof, road, etc."

Mr. Hedley used the apparatus himself, and found a mouthpiece and goggles much more convenient and comfortable to wear than the mask: the mask, he says, became painful after a short time, owing to the pressure of the bands on his head.

These examples showed how the Fleuss apparatus of twenty-five years ago could be used effectively and safely, even after the briefest training.

The apparatus now exhibited has been perfected so as to satisfy the requirements established by exact physiological investigation, and to give the greatest simplicity and strength with maximum comfort and safety.

The Equipment and Speed of Dressing.—The apparatus is carried in a strong leather and canvas equipment so arranged as to distribute the weight equally and comfortably, and at the same time, to give the wearer free movement of his arms. In the latest design the whole of this equipment is in one piece, consisting of a back-piece to carry the oxygen cylinders, and a breast-piece to carry the breathing bag and gauge; the back and breast pieces are connected by shoulder straps leaving a hole for the head. This equipment rests in readiness on a saddle, and the wearer catching it up can put it on in a moment. The equipment allows the wearer to be stripped to the waist, and covering little of the body permits free perspiration. Masks and tunics must not be used in hot moist atmospheres of mines, if heat-stroke is to be prevented. The inlet and outlet orifices of the breathing bag are closed by rubber corks. These can be withdrawn in another moment, and the flexible tubes leading from the mouthpiece inserted, together with the oxygen supply tube. The mouthpiece is placed in the mouth, the clip on the nose, and goggles on the eyes, and the man is ready. The whole performance can easily be done by the wearer himself in less than one minute. The oxygen bottles, of strong British make (in accordance with the recommendation of the Royal Commission), are carried in the small of the back, and are so slung from the shoulders as to give the minimum sense of weight.

Avoidance of Projections.—The back behind the shoulders is quite free, enabling a man to get along in a low mine road without the least danger of displacing unstable timber or rock. The wearer can crawl through a space measuring seventeen inches wide by seventeen inches high. The wearer knows that if his head and shoulders can pass in the crawling posture, the rest of his body, including the oxygen cylinders, can follow safely. The figure makes this clear.

It is most essential that the danger of the wearer displacing half fallen debris by projecting apparatus should be avoided, and it is equally essential that he should be able to creep through the minimum of space. Nevertheless in all other forms of apparatus the most bulky parts are placed on the back of the shoulders, and the wearer can have no knowledge of the proximity of these to the dangerous unstable structures which may surround him when exploring a seam after an explosion. The Fleuss-Siebe Gorman apparatus is arranged so that the head and shoulders can act like the vibraeula of a cat's whiskers, which tell it whether it can pass through a hole or not.

The apparatus is made with the fewest possible connections, and these are all controlled by one spanner. Thus any man can learn to put it together in a few

minutes, and there is no danger of any of the parts being misplaced or broken.

Valves of Oxygen Supply.—The oxygen cylinders are controlled by valves which do not allow the cylinders to leak when not in use. A reducing valve has been added which delivers approximately two litres of oxygen per minutes at all pressures. This means a slightly wasteful us of oxygen when the wearer is not working, but waste is deliberately chosen in preference to the risk of deficient oxygen. The Royal Commission on Mines have reported strongly in this sense. A relief valve is placed on the breathing bag, so that the wearer can let out the excess in case the bag becomes overfilled and expiration impeded. In spite of the necessary waste, the oxygen cylinders contain a supply sufficient to last two hours. A bye-pass fitted with an emergency valve is added, so that the wearer can fill the bag at once on first putting on the dress, or obtain an immediate supply if at any time his bag is accidentally compressed (and the gas driven out of it round the mouthpiece), or if the reducing valve fails to act.

An experienced wearer could safely set the reducing valve at one litre per minute and obtain a larger supply when needed during great exertion by means of the emergency tap. By this means he could extend the available time of the oxygen supply to about three hours. For general use it is wiser to diminish the available time in order to gain absolute security from deoxygenated air. Analysis taken when the Fluess-Siebe Gorman apparatus is in use show there is 50 to 80 per cent. of oxygen in the breathing bag.

Capacity of Breathing Bag.—The breathing bag is of ample capacity to yield a sufficient volume of air during the deep respirations of hard labor. It also acts as an efficiency elastic cushion to render the respiration easy and comfortable.

The Absorption of Carbonic Acid.—The caustic soda is placed within the breathing bag in the form of sticks. The bag can be opened and the sticks dropped in with the greatest ease and quickness, and the vulcanized india-rubber bag can be washed clean of the used soda under a water tap with equal convenience. There are exhaling and inhaling divisions in the bag to ensure the passage of the expired air through the soda. With each movement of the wearer the breathing bag is jolted and the carbonised surface is rubbed off the soda. A fresh surface is thus being constantly exposed for the absorption of carbonic acid gas. In other apparatus the caustic soda chambers are made of metal and are carried on the back of the shoulders, increasing the bulk, weight, and awkwardness of the apparatus.

Analyses show that the carbonic acid gas in the breathing bag keeps under 0.5 per cent. in conditions of hard labor when pure caustic soda (free from water) is used. The percentage may temporarily rise to 2 per cent. if hard work is done while the caustic soda is still cold, that is, before active chemical action has be-



Fig. 1

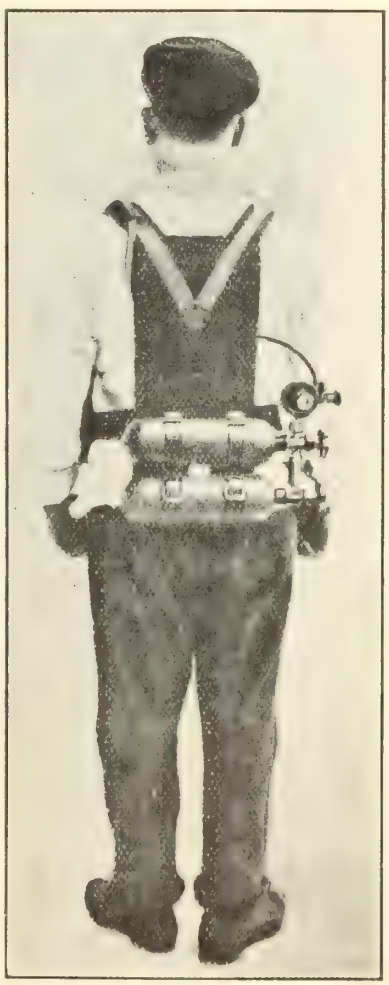


Fig. 2

The Fluess-Siebe Gorman Dress placed ready for use by the Wearer.

gun (or even 2.32 per cent. as on climbing stairs in one of the experiments of the Royal Commission). If the wearer rests or shakes the bag, the percentage immediately drops again to below 1 per cent. There is no risk or noteworthy discomfort produced by breathing a percentage of CO_2 up to 3 per cent., and the advantage of carrying the caustic acid in this simple manner outweighs any risk of slight and temporary increase in depth of respiration; this is the only result of breathing from 2 to 2.5 per cent. of CO_2. To overweight the apparatus or render it clumsy in order to obtain very low percentages of CO_2 is, in regard to breathing apparatus, a most mistaken policy.

The efficiency of the apparatus is shown by one of the wearers having performed 345,000 foot-pounds of work, on a single charge, in two hours.

The Gauge Visible to Wearer.—The pressure gauge is attached by means of a strong flexible tube to the front of the breathing bag, so that the wearer can tell at any moment the oxygen supply he has left, and beat a retreat at the right moment. This is an absolutely essential improvement, one on which the life of the wearer depends, but one that exists in no other apparatus.

The Mouthpiece.—The mouthpiece allows the wearer free movement of his head, being connected to the breathing bag by strong flexible corrugated tubes. The inhaling and exhaling valves in the latest pattern are of mica, and being of the simplest design, do not stick or get out of order.

The dead space between mouth and inlet to bag is not greater than from 150 to 160 c.c.

The mouthpiece is attached by a small rubber band which fits comfortably round the outside of the mouth, and buckles behind the head. The band prevents the mouthpiece from being jerked out.

The rubber parts of the mouthpiece which come in contact with the gums are soft and comfortable. The mouthpiece can easily be slipped out and the orifice closed by the thumb, thus enabling the wearer to say a few words of direction, or drink from a flask before replacing it in the mouth. This is a point of no little importance.

The nose clip is made comfortably to fit any nose.



Fig. 3



Fig. 4

Figs. 3 and 4.—Illustrating the Dress in use in the Exploration of Obstructed Mine Passages containing Irrespirable Gases

and cannot slip off. Mica goggles are supplied to protect the eyes, (in place of mouthpiece, nose clip and goggles, a half-mask can be worn if preferred), during work in smoke.

The report of the Royal Commission of Mines summarizes the data obtained as to the four points, (1) removal of carbonic acid, (2) supply of oxygen, (3) air tightness, (4) comfort and convenience, and gives the mark "Good" in all four to two forms of apparatus only, the Fleuss-Siebe Gorman, and the "Weg." The report, however, points out that in the case of the "Weg" dress, there is danger in the method by which the oxygen supply is delivered. This is shown by the analyses given on page 39, wherein the oxygen in the breathing bag is shown to have fallen, after exertion, below the danger limit, viz., to 10.6 per cent. The report says that this danger can be obviated "if the subject draws on the supply in the cylinders in slight excess of his actual requirements, and so washes out the apparatus during the whole period of use, and wastes some of the oxygen, and the conclusion reached is that the constant arrangement of an excess supply, as in the Fleuss-Sibe Gorman, is preferable. Such a supply relieves the strain of attention on the part of the wearer, and of anxiety concerning it, and sets him free to attend to his work. The Weg apparatus is "made only with a mask, and the construction of this, and its connections with the purifier and breathing bag by means of rigid tubes, necessitates the head-piece of each apparatus being made to fit only one individual." (Report of Commission.)

This seems to be a distinct disadvantage. The Fleuss-Siebe Gorman dress can be made to fit any man by adjusting the length of the straps. Its weight, fully charged, is only thirty pounds (as against the Draeger, thirty-nine pounds, "Weg," thirty-eight pounds), or less than the equipment of a soldier in full marching order. The oxygen capacity of the "Weg" apparatus is only 5.4 cubic feet. That of the Fleuss-Siebe Gorman 9 cubic feet.

It can be claimed, therefore, with some justice, that the Fleuss-Siebe Gorman apparatus is the most convenient, safest, simplest, lightest, and strongest on the market.

[Note.—Professor Hill has kindly promised to give a practical demonstration of Rescue Appliances at the Spring Meeting of the Society, and so add to the interest of this paper.]

INVESTIGATIONS RELATING TO GOLD AND SILVER BY THE UNITED STATES GEOLOGICAL SURVEY IN 1907.

(Abstract of advance chapter from Bulletin No. 340)

The Production of Silver.

Previous to 1859, the production of silver in the United States reached a maximum of only 38,500 fine ounces per annum. In 1859 the output rose to 116,000 ounces. In 1861 the figure attained was 1,546,900 fine ounces, and thereafter the increase was rapid, owing to the new discoveries in Nevada and Colorado. For 1876 the figures had almost reached 30,000,000 ounces. From 1876 to 1892 was the time of bonanzaz in Nevada, Arizona, New Mexico and Montana, and in the latter year the maximum of 63,500,000 fine ounces was recorded.

It was during this period that, owing to the production of silver as a by-product from lead and copper smelting, a serious decline in price commenced. As far back as 1833 a steady price of about $1.30 had been maintained. But from 1875 to 1892 the decline was continuous, and in the latter year the price fell to 87 cents per ounce. The failure of the old silver milling camps where pan-amalgamation was practised was inevitable.. However, silver as a by-product continued to be put upon the market and in 1894 a production of 49,500,000 fine ounces was attained. The next year the production rose to nearly 56,000,000 ounces. Since that time the production has remained approximately constant.

Geological Conditions.

Native silver is almost invariably due to oxidizing surface processes acting on primary argentiferous sulphides. One class of silver bearing veins is contained in granitic rocks or is accompanied by consolidated porphyries at depth. The normal gangue of these veins is white massive quartz through which the sulphides are sparsely disseminated. Such veins are apt to be rich near the surface, where secondary sulphides and sulphantimonites have formed, but generally they are disappointing below the water level, where the primary ore is reached. Others of similar type contain more abundant sulphides, among which galena generally predominates and may be successfully worked by concentration even below the surface zone of enrichment.

Another class of silver veins cut through volcanic flows which have consolidated at or near the surface. It can be proved that many of these veins were formed at very moderate depths. The gangue is prevailingly quartzose, but usually very fine grained, chalcedonic, and drusy, and in many places it contains adularia. The quartz is characterized by primary argentite accompanied by very small amounts of lead, zinc, and copper sulphides. In dry climates oxidation and the secondary deposites of sulphantimonites have enriched the upper parts to an extraordinary degree.

A third class of silver deposits are found in limestones and here generally in connection with intrusive rocks—granite, diorite, monzonite, or other porphyries. Almost without exception these ores contain lead, and usually copper and zinc. In their primary forms the value of the base metals generally exceeds that of the silver. Both quartz and calcite appear in the gangue. Secondary silver sulphides or sulphantimonites are less common in these ores near the surface, but native, and especially horn silver form abundantly. Mechanical enrichment by the solution of the limestone aids the ordinary concentration by oxidation, and thus the upper parts of many such deposits are extremely rich. Oxidized iron and manganese ores, almost free from lead but containing silver, are among the end products of the oxidation of these deposits.

Very likely it will be found that the three classes of ores mentioned are simply diverse products of the same vein-forming action; their characteristics being dependent on the depth below the surface and varying physical conditions, or on the caracter of the rock affected.

Classification of Ores.

The gradations between ores that may be selected as types make classification difficult. Nevertheless it is possible to arrange them in certain groups, on a metallurgical basis. Hence the silver product is divided ac-

cording to its derivation from placers, dry or siliceous ores, copper ores, lead ores, zinc ores, and mixed ores. Ores containing 2½ per cent. or more of copper are designated as copper ores. Those containing over 4½ per cent. are called lead ores. The dry or siliceous ores contain either very small amounts of copper, lead, or zinc, or none at all.

Silver produced in the United States in 1906 was divided thus:

Sources of silver produced in the United States, 1906.

	Fine Ounces
Placers	171,058
Dry or siliceous ores	16,792,799
Copper ores	15,880,870
Lead ores	15,328,653
Zinc ores	98,423
Mixed sulphide ores	9,090,650
Total	57,362,453

About 30 per cent. of the total silver production is derived from dry or siliceous ore and these ores constitute about 39 per cent. of the total tonnage of deep mines.

Siliceous Silver Ores.

Dry or siliceous silver ores may be defined as those in which the value of the silver is equal to or greater than that of gold, and in which copper and lead are below 2½ per cent. and 4½ per cent. respectively. In other words, on the basis of 62 cents per ounce the ore contains at least 100 ounces of silver to 3 ounces of gold. In 1906 the United States produced only about 700,000 tons of dry or siliceous silver ore, containing approximately 12,000,000 ounces of silver, $2,000,000 of gold, about 7,000,000 pounds of lead, and 80,000 pounds of copper. The silver ores clearly contain very little copper and three-fourths of this comes from Colorado. The silver ore is derived from 12 states, being produced at 219 mines in 103 mining districts. The average content is about 19 ounces of silver and $1.85 in gold per ton.

The silver-lead-copper ores yield silver to the amount of 3,078,592 ounces. The ores average 8 ounces of silver, $1.30 in gold, and 22 pounds of lead per ton. Their sources may be classified roughly thus:

	Ounces
1. Replacement deposits in limestone.	1,305,000
2. Fissure veins, connected with intrusive rocks (not always to be separated strictly from No. 1.)	712,000
3. Fissure veins in Tertiary volcanic flows	900,000
Total	2,917,000

The silver-gold ores from which 7,584,630 ounces of silver and $1,629,975 worth of gold are derived, average 28 ounces of silver and $6 in gold. Their total tonnage is 270,000 short tons. They are mined in 8 states and constitute the output of 50 mines in 22 mining districts. The whole production of Arizona in this class is derived from fissure veins in volcanic flows, principally rhyolite or dacite. Briefly, the ores of this class appear to be eminently characteristic of veins in Tertiary volcanic flows.

The third class of the dry or siliceous silver ores may be called the pure silver ores. They consist of those which contain no reported lead or copper, and in which the proportion of gold to silver is very small—less than 0.5 ounce of gold to 100 ounces of silver. Only about 1,500,000 ounces, or one-fortieth of the total production, are derived from these ores. They average only 15 ounces in silver and 25 cents in gold. Their principal sources are:

	Ounces
Replacement ores in limestone	574,000
Fissure veins in other rocks connected with intrusions	314,000
Fissure veins in volcanic Tertiary flows	466,000
Doubtful	149,000
Total	1,503,000

A large part of these ores consists of oxidized surface ores. Some of them are oxidized iron ores from the upper part of the deposits and really mined as flux.

The total production of silver in 1906 was 57,362,455 fine ounces. Of this, 40,398,596 fine ounces were recovered from lead, copper, or zinc ores, and 16,792,799 fine ounces from dry or siliceous ores.

Analysis of the distribution of production between the various classes of ores, brings out the well known affinity of silver for lead and emphasizes the slight degree in which copper and zinc are associated with silver ores properly so called. The selective action of limestone in the precipitation of silver, lead compounds is also emphasized.

SUMMER'S WORK OF THE GEOLOGICAL SURVEY IN THE WEST.

So far as can be learned at date of writing the following parties will be sent out by the Geological Survey to work in the districts mentioned:

Mr. D. D. Cairns will delimit the coal bearing rocks of White Horse coal area.

Mr. R. Graham will make a geological study of the Pacific coast and inlets from Kingscome Inlet northward. This will be a continuation of the work of last year.

Mr. R. G. McConnell will examine the geological features of Texada Island with special reference to ore deposits.

Mr. J. Keele, who was engaged last season in exploring the Continental Divide, near the head of Pelly river, and wintered there, will this season explore the Mackenzie slope of this district.

Mr. W. W. Leach will continue his exploratory work in the Bulkley valley.

Mr. John Macoun will investigate the fungi that cause the rapid decay of mine timbers in British Columbia. Assisted by Mr. Spreadborough, Mr. Macoun is also making a collection for the new museum to illustrate the flora and fauna of Vancouver Island.

Mr. V. Stefansson has been sent out on a joint expedition under the auspices of the Museum of Natural History, New York, and the Geological Survey, to the region about Coronation Gulf in the Arctic. The geography and mineral resources of the region will be examined. The condition of life among the Esquimo, who have not come into contact with whites, will be reported upon.

Mr. Owen O'Sullivan has left for Hudson's Bay to complete the instrumental survey of the coast.

Mr. A. W. G. Wilson has gone into the Nipigon region to complete the work for a report to accompany a map now being prepared.

STANDARDIZATION.

The Institution of Mining and Metallurgy.

[Editor's Note.—The invaluable work undertaken by the Institution of Mining and Metallurgy in the direction of standardizing the terminology of mining and metallurgy has an especial significance for Canadians. Mining has increased vastly in importance as a Canadian industry within the last decade. It is undeniably desirable that Canadian mining men should be familiar with and should conform to the best usages. With this in view we invite answers to these questions.]

Sectional Committee "B."—Bullion and Assay Values.

Your opinion is requested on the following matters:

(1) Do you approve that, wherever possible, assay values of gold and silver ores and products shall be reported in ounces and decimals, or pennyweights and decimals, rather than in ounces, pennyweights and grains?

Note—For ores and products where the use of pennyweights rather than ounces would not be unduly cumbersome, it is suggested that the former be always used.

(2) Do you approve that assay values of alluvials shall be reported in grains and decimals of a grain of "fine" gold, or in pence at 2d per grain of "fine" gold) or cents per cubic yard or per ton? If reported per ton, should one cubic yard of ordinary damp alluvial, excluding boulders, be taken as equivalent to 3,000 lb.? If not, what do you recommend?

Note.—The value of 2d. per grain is suggested as convenient and sufficiently accurate. At 85s. per ounces, the value would be 2.125d. per grain. The figure of 3,000 lb. (1½ short tons) is commonly used and is suggested as a convenient factor.

(3) Do you approve that in cases where money values are given for assays of silver, copper, tin and other metals whose value fluctuates, the market price of a stated quality or brand of the metal, as taken for calculating such money value, shall be given, together with the assay value in ounces, etc., per ton, or in per cent. or other concrete quantity?

(4) Do you approve that in reporting assay values of cyanide or other solutions,

(a) Results shall be reported in ounces or pennyweights, etc., in a stated volume of such solutions?

Or do you prefer

(b) The use of the ton of 2,000 lb. instead of volume?

(5) Do you approve that in reporting assays of silver and gold products and ores, the assayer shall state on his certificate whether the slags have been "cleaned" and allowance made for cupel absorptions?

(6) Do you approve that all assay reports shall state the exact condition of the sample as to dryness, when assayed?

Sectional Committee "E."—Mine Accounts and Cost Sheets.

(1) Do you think that it is practicable to unify and state precise definitions of some or all of the many terms now used in mining accounts vaguely and with varying meanings, so that, for instance, "Cost of Ore Extraction" should mean the same thing and cover the same scope all the world over?

(2) Will you give as many instances as possible of material variations or differences in practice which in your opinion could or should be standardized?

(3) State your definition of Expenditure which can properly be termed Capital Expenditure:

(a) Before reaching the producing stage.

(b) After reaching the producing stage.

(4) Can you formulate a suitable rule to apply to the classification of expenditure, as to whether such should be charged direct—

(a) To Capital Account?

(b) To Working Costs? or

(c) To a Temporary Account (sometimes called a "Suspense" Account)?

(5) How would you deal with expenditure on development and shaft-sinking?

(a) In a mine in its initial stages of development.

(b) In a mine which has reached the producing stage.

(6) Would you differentiate between expenditure on the work of developing known ore bodies or deposits, as distinguished from work of a purely exploratory or prospecting character?

(7) Do you consider that estimates of the value (or cost) of ore in reserve or on dumps, or of the value of intermediate products or bullion on hand be taken credit for partly or wholly in accounts?

(8) Do you consider that forms for periodical mine reports, and statements of accounts, can be standardized and brought into comparative uniformity? If so, will you kindly submit examples?

(9) What terms would you use in preparing segregation of cost sheets and what would you include under each term? e.g.

(a) Cost of mine development?

(b) Cost of mining or stoping or ore extraction or any other similar expression. Should this term include cost of timbering, putting ore broken in skips, loading into cars, trucks, bins, or skips, cost of hoisting to surface, and of handling and delivery to mill or dump?

(c) Cost of reduction, milling, cyaniding, smelting, etc.?

(d) Cost of general charges and administration expenses. Should these be given under separate headings or should a proportion be allocated to each department?

(e) Cost of head office charges. Should these be included in working costs, and if so, should they be apportioned over other accounts or not?

(10) What would you include under Section (c) last mentioned? e.g., would you include the following items:

Cost of delivery from main ore bins?
Cost of coarse crushing in stonebreaker?
Cost of further crushing in stamp rolls, etc.?
Cost of roasting?
Cost of amalgamating?
Cost of grinding?
Cost of cyaniding and treating sands?
Cost of cyaniding and treating slimes?
Cost of disposal of waste products?
Cost of disposal of waste products?
Cost of smelting and refining bullion?
Cost of realization of bullion?

(11) How far would you segregate the items included under (9) and (10)?

(12) Do you approve of—

(a) Charging each department with its quota of power used? And if so

(b) On what basis or system would you allocate it to the various accounts?

(13) Would you make any allowance for depreciation? And if so,

(a) How would you charge it in accounts?

(b) What average percentage would you allow on buildings, plant, and various kinds of machinery?

(14) would—

(a) Provide for the redemption of shaft sinking and mine development in working costs? And if so,

(b) On what basis would you calculate it?

(15) Would you—

(a) Charge repairs and maintenance in your cost sheets to the various departments to which they apply? Or

(b) Treat them as one item of cost?

(16) Would you set aside as a reserve fund to meet any of the contingencies to which mines are liable—

(a) A fixed proportion? Or

(b) A proportion of the annual profits? Or would you prefer to

(c) Write down the assets on which no depreciation is allowed?

(17) How should depreciation on stores be provided for, and to what account should it be charged?

(18) On what basis would you calculate yield, working costs and profits?

(a) Per ton mined?

(b) Per ton milled?

(c) Per ton treated?

THE USE OF PORTABLE AIR COMPRESSORS.

By Frank C. Perkins.

Compressed air is utilized very largely not only for drilling and in tunnel construction, but also for bridge building and other structural work where the pneumatic hammer and other air tools are utilized to special advantage.

It is often desirable to provide a portable air compressor for operating these tools and these devices are

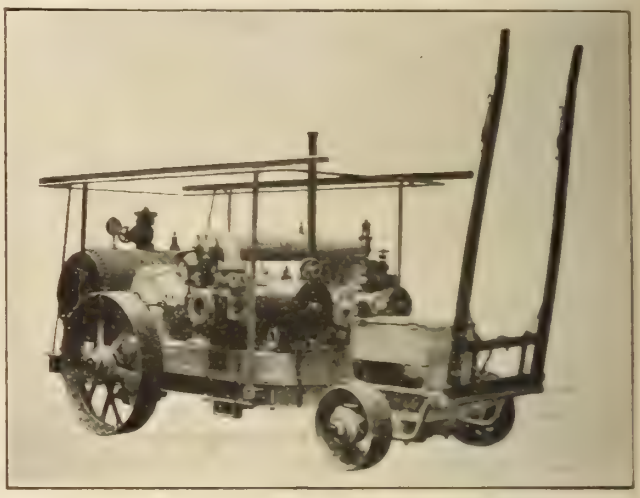


Fig. 1

now constructed not only driven by steam and gasolene, but also by electric motors to great advantage.

The accompanying illustration, Fig. 1, shows a portable steam driven set of Scotch design and construction as utilized at His Majesty's Portsmouth Dock Yard. This two stage compressor and receiver constructed at Glasgow has a capacity of 200 cubic feet. It will be noted that it is of the horizontal type with water cir-

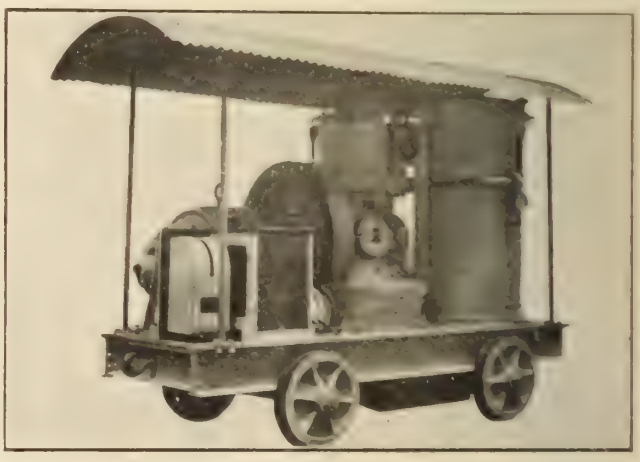


Fig. 2

culating pump mounted on a truck with wheels for road service, and is easily arranged as a stationary plant by dismantling the wheels if it is to be used for a long time at any given point.

Electrically operated compressors of the portable type are largely used in ship yards where current is available, as at the plant of the Fairfield Ship building and Engine Company Limited, at Glasgow.

The accompanying illustration, Fig. 2, shows an electric portable compressor plant of 200 cubic feet capa-

city utilized at this Scotch ship yard. It is of the vertical, two stage type, with fly wheel of large dimensions geared to the electric motor, the controller and air receiver with water circulating pump and water tank being mounted on a truck fitted with wheels for industrial railway service.

Where compressed air is used in mining and portable electric motor driven compressors are employed, it is frequently necessary that they shall be of low con-

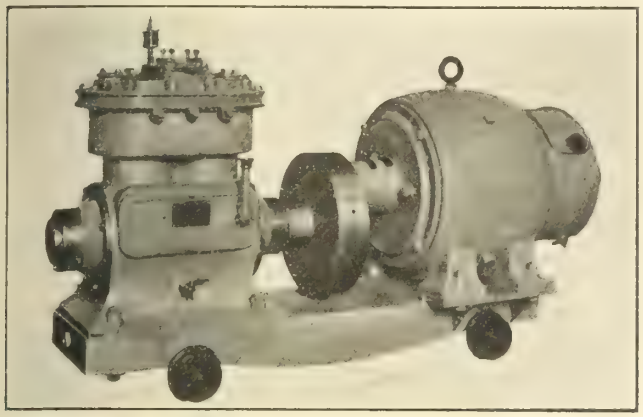


FIG. 3.

struction, as many times they are required for use in situations where the head room is scarce, and such a portable electric air compressor equipment may be seen in the accompanying illustration, Fig.3. This consists of a double cylinder, vertical compressor having a capacity of 200 cubic feet, geared to an electric motor of the enclosed type and mounted on a low truck with wheels of small diameter designed for use on the narrow gauge track used in mines.

THE GOLD ALLUVIALS OF THE RIVER DRAU IN HUNGARY.

By A. von Gernet, Member.

Paper read before the Institution of Mining and Metallurgy, April, 1908.

Gold has been produced by native diggers on the banks of the river Drau for several hundreds of years, and at the present time there are some 200 men earning their living at this work, which is being performed by most primitive methods, with an average yield of from 2 shillings to 3 shillings per day per man. Recently, a firm in Vienna obtained the rights to exploit the gold bearing gravel for a distance of 25 miles between Zakany and Visvar, and the author, who was engaged to study the proposition for the firm during the summer of 1907, obtained information which he thinks of sufficient interest to be placed before the Institution.

The river is shallow, wide and rapid, and consists of several channels having a maximum depth of 10 feet, forming a number of islands. The surrounding country to a width of from one to two miles, as well as the islands and the river bed, are formed of gravel, and at certain seasons, after heavy rains and the melting of the snow on the uplands, are covered by from 3 to 5 feet of water. At such times the stream runs at a speed of about 4 feet per second, and moves the gravel banks rapidly from one place to another, thereby changing the aspect of the river by the formation of new islands and channels. The gravel generally is 25 feet deep and rests on a clay formation.

Gold occurs in small grains, the richest places being without exception those exposed to the strongest current and composed of coarse gravel. The top layer of 6 inches frequently carries a value of from1 shilling to 1 shilling 6 pence per ton, the value diminishing in depth until at 2 or 3 feet down it is only 1 or 2 pence per ton. It is of interest to note that rich places, after being worked out, become enriched again at the next time of flood, which might last for a week or two only, and will then sometimes contain as much value as originally. Holes were sunk from 10 to 12 feet deep by means of a hand-operated dredging apparatus, and fairly uniform results averaging 1 to two pence per ton were ascertained. The same values were found when dredging in the bottom of the river bed itself.

Method of Determining Values.—It was necessary to ascertain whether panning small samples and counting colors could be relied on as a sufficiently accurate method of determining values. For this purpose a sluice-box with riffles, matting and expanded metal, capable of treating 40 tons of gravel per day, was established and kept going in various places, and simultaneously samples of the same gravel (20 pound each) were panned and the number of resulting colors were counted. The actual gold production of every lot treated was compared with the panning results.

Table of Results.

Gravel treated. Tons.	Gold produced. Dwt.*	Value per ton. d.	No. of colors per sam.	Ratio of colors per sample to pence per ton.
80	4.5	2.3	15	1 :0.153d. per ton.
100	1.66	0.7	4	1 :0.175d. per ton.
40	1.4	1.4	9	1 :0.155d. per ton.
68	8.0	5.4	34	1 :0.160d. per ton.
37	6.3	7.2	33	1 :0.215d. per ton.
68	10.0	6.2	39	1 :0.160d. per ton.
593	90.6	6.5	49	1 :0.130d. per ton.
90	5.0	2.4	20	1 :0.115d. per ton.
97	14.0	6.2	27	1 :0.222d. per ton.
98	10.0	4.3	41	1 :0.105d. per ton.
46	3.6	3.4	24	1 :0.140d. per ton.

*Bullion, 1 dwt. = 42d.

The points of interest on which the author desires to lay stress are:—

1. The rapid local enrichment of the gravel produced by natural concentration.

2. The uniformity and reliability of results obtained by panning and counting colors.

It stands to reason that the ratio between value per ton and colors per sample will represent different figures on different alluvial fields.

BENDING OF THE LAND BY STORMS.

The tilting of the ground in storms has been studied by Prof. Omori, of Japan. In October, 1904, a cyclone, the centre of which passed over the sea to the east, tilted the ground at Tokio 3½ seconds toward the area of low pressure; and, in January, 1906, a cyclone centre passing northeastward over the land near Tokio

gave a tilting first to the east and then to the westward as the low pressure moved onward, the total change of inclination being 2.87 seconds. The ground rose under low pressure while in the former case it sank—a difference explained by the fact that the rise of sea-level commonly more than compensates for lowered air pressure, so that the pressure on the sea bottom is actually greatest with low barometer.

THE SPRINGHILL BOARD OF CONCILIATION.

Failure to reach a unanimous conclusion marked the deliberations of the second Springhill Board of Conciliation.

The dispute between the Cumberland Railway and Coal Company, Limited, and certain of its employees was resolved into four separate claims advanced by Mechanics Lodge, No. 23, P. W. A.. The Board was composed of Judge Wallace, chairman; the Hon. J. N. Armstrong; and Mr. R. B. Murray, the last named was the men's representative. Judge Wallace and the Hon. Mr. Armstrong found in favor of the Company on all four counts. Mr. Murray found in favor of the men on all but one claim.

Both the majority and the minority reports are temperate in tone and the conclusions reached are carefully substantiated. However, Mr. Murray's dissenting report would have lost nothing if the last paragraph (which is not reproduced here) had been excised.

Beginning on May 13, when the first session of the Board was held in Springhill, sittings were continued throughout and the subsequent day. Deliberations were resumed in Halifax on May 18. The reports were made public on May 27th.

The following are the findings of the majority:

There are four classes of cases, "A," "B," "C," and "D," in dispute between Mechanics Lodge No. 23, P. W. A., and the Cumberland Railway and Coal Company, Limited.

Claim "A" is in respect to an advance of wages for repair work. There are two classes of men in the Mechanical branch, working on repairs, viz.,—those who labor underground, and those whose work is performed on the surface, the present rate of wage for the former class being 15 cents per hour, plus 22 per cent., and the rate for the latter class being $1.20, plus 22 per cent. per day. The wage now asked for on behalf of this class of underground and surface work is a flat rate of $1.85 per day of 8 hours for underground men, and 10 hours for surface men.

Undoubtedly the work in question is disagreeable and trying.

It is urged by the applicants, as a justification for the increase desired, that this class of work commands a higher rate of pay in some other collieries, and as proof of this contention the schedule of rates applicable to the Dominion Coal Company's employees was put in evidence. In reply, the Mechanical Superintendent of the Cumberland Railway and Coal Company testified that this class of men were paid at a higher rate at Springhill for the same number of hours, than the employees of the Dominion Coal Company. The tabulated statement marked in the written answer of the Company was also verified by the Assistant to the General Manager.

The applicants for an increased rate of pay seemingly regard this question of the rate of pay prevailing in other similar employment within the Province of Nova Scotia under similar conditions as affording a fair test to enable the Board to determine what would constitute a fair wage. Applying that test, which is generally a fair one, to the issue before the Board, and examining the whole of the evidence upon that question, the Board finds that the applicants in this class are paid at least as high a rate for the number of hours as men of a similar class employed by the Dominion Coal Company.

The Board finds that the applicants in this class have not established their claim to the desired increase.

Claim "B" is on behalf of the fan-men at No. 3 mine. An objection was raised by the Company in regard to this claim, and also to the two following claims, that as the persons affected were less than ten in number, the Act did not apply. The chairman ruled against this objection.

The present rate of wage for the fanmen per day of 12 hours is $1.20, plus 22 per cent. They ask for a flat rate of $2.00 per day of 12 hours. The Board finds that the work which they have to perform is work generally given to old or infirm employees. One of the claimants has been sick for two years and could not perform any other work, and therefore applied for this work. The other claimant had a crippled leg and he requested a similar job. It was asserted on behalf of these men, that workmen doing similar work for the Dominion Coal Company get a better rate of pay, but the Board finds that the employees doing this work at the works of the Dominion Coal Company have also the responsibility for the air compressors and that their work is substantially different.

The Board therefore unanimously rejects this claim.

Claim "C" relates to Charles Ronney. It appeared that he is in the same class and is paid at the same rate as ten others. They are not skilled workmen, but might be described as handy men. While there may be only a slight difference between this claimant and some of the men in the class just above him, the Board finds that the applicant in this case has not established his claim for the increased wage.

Claim "D" relates to the cases of Wilson Demmings, car inspector. His wage is $1.30 plus 22 per cent. per day. Applicants ask on his behalf a flat rate of $2.00 per day, claiming that is the rate which such class of work commands elsewhere. This employee has now the benefit of an assistant at his work, and the duties of Mr. Demmings have not increased since the increase of pay given him. It was amply shown by evidence to the satisfaction of the Board that Mr. Demmings is a painstaking, industrious, and capable employee, but the Board cannot find that he has established his claim to the increased rate asked for by him.

The Board deems it proper to add to its findings this statement,—that the declaration in the "ultimatum" issued by the general manager of the Company last October, when the men returned to work, "that there cannot be any increase in wages in the district covered by the award now or later," would not in any way have interferred with a finding in favor of any of the

applicants herein if the evidence submitted to the Board justified suc ha finding.

The minority report, which it was decided to forward to the Department, read in part thus:

In the application for this reference there were four cases set out as being in dispute between the Lodge and the Company, these cases were designated in the application as follows:

First case.—Is in respect to an advance on wages for repair work.

Second case.—Is in respect to an advance on wages for No. 3 fanmen.

Third case.—Is in respect to an advance on wages for Charles Ronney, carpenter.

Fourth case.—Is in respect to an advance on wages for Wilson Demmings, car inspector.

Although the foregoing cases were not taken up by the Board in the order named, it is the intention of the writer to discuss and report on them in successive following, therefore the "repairs rate" shall be the first under consideration.

The evidence disclosed that in this employ there are at least two classes of repair work in connection with the mechanical branch, repairs to steam pipes and machinery underground and repairs to pipes and machinery overground, including of boilers. In the underground section, there seems to be about ten men affected, and in the overground one man only, Andrew McCarron claimed redress at the hands of the Board. For the underground men the witnesses George McLeod and John Campbell gave evidence which seemed conclusive, that their work was performed frequently in high temperatures, sometimes at 116 degrees, their hours were erratic, being subject to a call at any time during the night when their day work is over, and in addition to this, to use their own language "we are frequently employed on Sundays." The present rate of pay for these men is 15 cents per hour plus 22 per cent., their contention being that this rate is altogether inadequate for the class of labor they are called upon to perform. In view of their receiving no excess pay for their Sunday work or extra calls, as it appears is customary in other places in similar industries and on work where Sunday labor is necessary, and in view likewise of their having to work mostly under conditions and at a temperature which they claim are hazardous and must of necessity be prejudicial to health, the claim the Lodge is making in their behalf of 39 cents per day of eight hours, extra, surely cannot be considered an unreasonable one. The Company through Mr. Muirhead, contends, that these men are sufficiently paid already. This is natural and usually the plea put forward in such cases by employers, but it does not lessen the fact of the soundness of the men's claim notwithstanding. To emphasize the reasonableness of the Lodge's contention, they put in evidence a telegram from the general manager of the Company wherein an express promise was made, that under certain conditions, this matter of repair rates would be adjusted to the satisfaction of the men interested. The Company now repudiate that telegram, or as Mr. Stewart puts it for them "the whole thing is now off."

So convinced am I that the Lodge has made its claims and contentions good with respect to this underground repair work I have no hesitation whatever in recommending that men at this class of work should be paid a flat rate of $1.85 per day of eight hours. My conviction is, taking all the circumstances into consideration, any jury in the land should award them at least this amount.

With respect to the other class of repair work, with which Andrew McCarron alone is interested, this man swears he is at present and has been for the past sixteen months employed in the class of labor known as overground repair work and tending engines and boilers at the machine shop and No. 1 mine, his duties also consist in cleaning boilers at Nos. 2, 3 and Aberdeen mines. His present rate of wage is $1.46 per day and in the Lodge's application a request was made on his behalf for $1.85 per day. His evidence shows that when he is occasionaly taken from his usual work of repairs and boiler cleaning and put to tending engines and boilers, he has been paid the rate of wage which such latter work calls for and which is in excess of the pay he receives when at the former class of labor. Beyond a doubt the cleaning of boilers is hot and very dirty work and $1.46 appears a very small day'spay for the performance of it. McCarron has frequently to be in charge of two or three men and receives only 6 cents per day more than they do. Is it not fair to assume that the man who directs should get more than 36 cents per week over the men who are directed?

The Company, through Mr. Muirhead, seem to have little to say with respect to this case. It was admitted the work of cleaning boilers was dirty but nothing was said by this witness that would indicate the claim made on behalf of McCarron was an unfair one. This may have been an oversight on Mr. Muirhead's part, but should not now be pleaded to the prejudice of McCarron. It may be safely inferred, however, that McCarron cannot be classed as a skilled laborer in the same sense as the underground repair men, nor could he, if called upon to do so, be able to perform the same grade of work as McLeod and Campbell and the others who have Winfield McInnes as their leading man. On that account and for the further reason of the trend of the evidence, I cannot uphold the Lodge's claim of $1.85 per day for this man, but strike a medium and recommend that his pay should be increased from $1.46 to $1.65 per day of ten hours.

The second case concerns two men, Arthur Cooke and John D. Cameron. These men are employed as fanmen at No. 3 mine, they work on twelve hour shifts opposite to each other. From the evidence, it seems their work consists in the main in constant attendance on their engine and the principal feature of it is its monotony. The job under the law requires the holders to be possessed of certificates of competency. Cooke and Cameron's pay is at present $1.46½ for twelve hours. The Lodge has asked on their behalf $2.00 for the same time. The Company take very strong exception to this case, and claim that it is work suitable only for broken down or worn out men and was given to Cooke and Cameron "simply because they made application, and if they are able to perform other duties there is a good job open for them." Mr. Muirhead further stated that a boy of ten years could do equally as well the work that is necessary.

Taking this matter into long consideration and viewing it as I have from every aspect, and with a full knowledge it involves upon me, I am led to the conclusion, that in a spirit of fairness I cannot do otherwise but recommend that the prices for this class of labor remain as at present, but this recommendation is not to be treated as a precedent for future demands

by the Lodge or individuals employed at it, for an increased pay in respect to it.

The third case. This relates to a demand for an increase of pay for Charles Ronney, a carpenter, from $1.40 plus 22 per cent. to $1.60 plus 22 per cent. The evidence goes to show that Ronney has been engaged for fifteen years or more at the carpenter trade, he works side by side with two others who receive $1.60 plus 22 per cent. and does exactly the same class of work as they perform. He swears he is equally competent as they, working at finishing houses, making trolleys, wood wagons, mine cars, etc., he swears also the work is all alike, that of one being no better or worse than the others. The witness Anthony Johnson, corroborates Ronney's testimony in nearly every particular and swears Ronney is a competent and efficient carpenter and conscientiously says that his present rate is inadequate for his services and not in accordance with other carpenters in the employ, who receive $1.60 plus 22 per cent. per day, and further from his knowledge of Ronney's ability and because he does exactly the same class of work as the other two referred to he should receive the same wage as they. The Company make reply to this by stating that Ronney is not a tradesman and name him as a "handy man" and in the same class as ten others. Mr. Muirhead swears that Ronney is on a par with the ten men referred to and that they are not skilled workmen. Inasmuch as Ronney is not in Mr. Muirhead's department, not much credence should be given to the latter's evidence. It was evidently made in good faith but must of necessity be largely hearsay and not from a personal knowledge of the facts. That Ronney "is" a tradesman in the broad sense of the word can hardly be doubted, and to classify him with the box repairers on the bank heads is unfair. The telegram from the general manager herein before referred to contains this clause "Charles Ronney's claims will be considered when work is resumed as well, and if he is entitled to the wage he requests, the same will go into effect from the 16th inst (i. e., August, 1907)." The question then arises, has the Lodge proved that Ronney is entitled to the wage he requests, or should the mere ipse dixit of the Company be taken that he is little better than a wood butcher? It strikes me the only fair and tenable ground for me to stand on with respect to this third case is to recommend that Charles Ronney receive a daily wage of $1.60 plus 22 per cent. and I so recommend accordingly.

The fourth case, as stated in the application, "is in respect to an advance on wages for Wilson Demmings, car inspector." Here is a man who has been in the employ for fourteen years, sober, painstaking, careful and industrious with the lives of the travelling public and valuable rolling stock committed to his care, a letting up of vigilance on his part would result in loss of life and property and yet his pay only amounts to the meagre sum of $1.58½ per day. He swears that during all the time he has been car inspector, there has never been a case where an accident has occurred through any neglect on his part, he also swears he has tried on various occasions to get consideration by way of increased pay and they (the Company) gave him the impression they would consider it favorably. Demmings' evidence is reinforced in a most convincing way by that of George Watt, I. C. R. car inspector at Springhill Junction, who among other things says, that Demmings' duties are practically the same as the duties of a car inspector on the I. C. R. For such work as he (Demmings) has to perform, they would receive $2.00 per day on the I. C. R. for ten hours, the witness also testified that considering the duties Demmings is called upon to perform, the sum asked ($2.00) is quite reasonable.

The Company, as in Ronney's case, set up the plea that Demmings is being sufficiently paid already, and Mr. Muirhead who, although he testified to having nothing to do with Demmings, not being in his department, sought to break down the weight of Mr. Watt's evidence by making a comparison of the work of the latter with that of Demmings, which is not the case in point at all. Watt is the head car inspector at the Junction and receives 24 cents per hour and extra pay for overtime and night work. The proper comparison should be with men under Mr. Watt who receive 20 cents per hour and for night work time and a half, and whose work is identical with that performed by Demmings.

The evidence tendered by the Lodge in support of this claim is to me so convincing that I have no hesitation whatever in arriving at the decision that they have made out a case. I accordingly recommend that Wilson Demmings shall have his present rate of wage of $1.58½ per day increased to that of $2.00 per day of ten hours.

THE DETERMINATION OF COBALT AND NICKEL.

By W. K. McNeil.*

So for as the Cobalt district is concerned, the principal minerals of which nickel and cobalt are essential constituents are:

Niccolite.—Arsenide of nickel, Ni As.
Smaltite.—Diarsenide of Cobalt, $Co\ As_2$.
Millerite.—Sulphide of nickel, Ni S.
Cobaltite.—Sulph-arsenide of cobalt, Co As S.
Erythrite.—Cobalt bloom, $Co_3\ As_2\ O_8 + 8\ H_2\ O$.
Annabergite.—Nickel bloom, $Ni_3\ As_2\ O_8 + 8\ H_2\ O$.

The following method of analysis has been found useful in the routine developed after a considerable experience in handling Cobalt ores.

Procedure.—Weight out 0.5 to 1 gramme of finely pulverized ore. The amount taken depends upon the percentages of nickel and cobalt present. Decompose by adding nitric, hydrochloric, and sulphuric acids. Not more than 3 to 5 c.c. of sulphuric acid is to be added, as it is used here as an indicator. If an excess is used it will interfere in later operations. Evaporate to white fumes, cool, dilute and filter.

The fifth and sixth groups are now precipitated by H_2S, after the solution is thoroughly reduced by SO_2 directly, or by adding sodium sulphite. Care must be taken to have the excess of SO_2 driven off and also to pass the H_2S through the solution for some time, especially for ores containing a large amount of arsenic, such as niccolite and smaltite. If the solution is kept hot while the H_2S is being passed in, the precipitation is much more rapid and complete. The H_2S may be passed into a cold solution and heat applied gradually. The solution should now be boiled to expel the excess of H_2S. Filter and repeat the precipitation as it is important that all arsenic be removed from the solution.

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* Manager of the Canadian Laboratories, Toronto.

The next step is to remove the iron and alumina by first oxidizing with a small quantity of nitric acid or sodium peroxide, and adding ammonia slowly to the boiling solution. If care is taken to have the solution completely oxidized and the precipitant added slowly, the nickel and cobalt will not be carried into the precipitate to any extent. Wash the precipitate thoroughly with hot water and re-dissolve and re-precipitate. This may be repeated until the filtrate does not indicate cobalt or nickel.

Concentrate filtrates and add enough $(NH_4)_2\ SO_4$ to have the total bulk of the solution in the proportion of about 3 grammes for each 0.1 to 0.2 grammes of cobalt and nickel present. If too much sulphuric acid is added in the first solution of the ore this operation is interfered with.

The nickel and cobalt are now precipitated by a current of 0.7 amperes (maximum) the solution being at the temperature of 70 degrees C. The time required is two to four hours according to temperature.

If the cathodes blacken it means that the current is too strong or that arsenic has not been completely removed.

After weighing the cathodes, dissolve off the deposited nickel and cobalt with nitric acid using as small a quantity as possible. Neutralize with KOH, make acid with acetic, and add a concentrated solution of potassium nitrate, stirring for some time. Enough acetic should be added to make noticeable the evolution of nitrous fumes after the addition of potassium nitrate. Allow the solution to stand in a warm room for 24 hours. Filter and wash the precipitate of $Co_2(NO_2)_6$.-$6KNO_4$ which should be yellow and crystalline with 10 per cent. solution of potassium acetate then with alcohol. It may be now treated with H_2SO_4 and converted to $3K_2\ SO+2CoSO_4$ and weighed, or dissolved and electrolyzed under the usual conditions and with the usual precautions.

SOME FEATURES OF SILVER ORE TREATMENT IN MEXICO.

Part II.—Theoretical Considerations.

(Abstract of paper read by W. A. Caldecott, B.A., F.C.S. before the C. M. and M. Society of South Africa.)

The following discussion is rendered imperfect on account of the non-arrival of a parcel of Mexican silver ore, which was to be tested to develop and confirm the tentative conclusions arrived at from an examination of the properties of artificially prepared silver sulphide. It is probable that since the mineral silver sulphide is coarser and more compact than the artificially prepared compound its dissolving in cyanide solution is slower, thus allowing more time for secondary reactions to proceed.

The primary reaction in the dissolving of silver sulphide from its ores may be taken as

$$Ag_2S+4NaCy=2NaAgCy+Na_2S-(1)$$

When, however, a certain amount of silver has been dissolved an equilibrium is established. How far the reaction has proceeded before this equilibrium is attained, depends upon the amount of soluble sulphide of any kind in solution and the amount of free cyanide present.

This is illustrated by the following table, showing results from a series of argentiferous sodium cyanide solutions of the strengths stated, 100 c.c. of each of which was titrated with 0.1 per cent. sodium sulphide solution until a brownish coloration was pust produced. A deduction of 0.05 c.c. was made from each reading, so as to give the amount of sodium sulphide that could be added without reacting upon the silver present.

Table A.

Per cent free cyanide	Silver present mgrms per litre	Na_2S required mgrms per litre	Equiv. sol. Ag. present (as Ag_2S) mgrms per litre
0.50	490	5.3	14.7
0.40	392	4.4	12.2
0.30	294	3.1	8.6
0.20	196	2.0	5.5
0.10	98	1.0	2.8
0.05	49	0.7	1.9

An inspection of the foregoing table, in which milligrams per litre may be read as grams per metric ton, shows that the amount of silver sulphide capable of being dissolved as the soluble double alkaline cyanide is approximately proportionate to the amount of free cyanide present, but even with 0.5 per cent. solution the quantity of dissolved silver is less than 0.5 ounce per 2,000-pound ton. Further, the introduction, through presence of a free alkali or otherwise, of soluble sulphides into the argentiferous cyanide solution from any mineral or other source will result in the precipitation of silver already disolved.

The fact that dissolved silver and other than very small amounts of sodium sulphide cannot exist simultaneously in the same solution serves to explain why working solutions do not show more than traces of sodium sulphide when sulphide ores are being treated. With solutions low in silver it is difficult to filter off the very finely divided precipitate formed on addition of sodium sulphide solution.

In practice, many ounces of silver per ton existing as sulphide can be dissolved. This is explained by the occurrence of secondary reactions, which show the conversion of soluble alkaline sulphide first formed, into other compounds which do not preclude the further solution of silver. These secondary reactions several of which no doubt proceed simultaneously, are:

(a) $2Na_2S+2O_2=Na_2S_2O_3+Na_2O-(2).$
$Na_2S_2O_3+Na_2O+2O_2=2Na_2SO_4-(3).$
(b) $Na_2S+NaCy+O=NaCyS+Na_2O-(4).$
(c) $Na_2S+PbO=PbS+Na_2O-(5).$
$PbS+NaCy+O=NaCyS+PbO-(6).$

The foregoing reactions, when carried to completeness, all involve absorption of oxygen, whereby the utility of aeration may be accounted for, apart from its accelerating the solution of any metallic silver or gold present in an ore under treatment. Reaction (a) proceeds more rapidly than does (b), and since it does not involve destruction of cyanide and since it produces in the first stage sodium thiosulphate, (itself a silver solvent) it may be considered the most desirable result of aeration.

Apart from any re-formation of PbO, nearly as much lead as there has been silver present as sulphide is required to carry equation (5) to completion.

A study of the molecular weights involved in equation (1) shows that the silver requires nearly its own weight of sodium cyanide to discolor it, so that the consumption from this cause alone with 500 gm. silver ore would be nearly a pound of sodium cyanide per ton.

This feature of high cyanide consumption renders the field for cyanide regeneration more promising than with banket gold ores. Although oxygen does not play the direct part in dissolving the silver that it does in gold ore treatment, yet its importance in permitting solution to proceed, and the present necessity for the tedious process of repeated agitation and aeration, appear evident.

A series of experiments demonstrated, by the trivial amount of silver in the precipitate, how effectual is the presence of lead in preventing precipitation of silver, and consequently in permitting the dissolving of silver sulphide to proceed in spite of the concurrent formation of solubel sulphide.

SUMMER EXCURSION.—CANADIAN MINING INSTITUTE.

The following is a provisional programme prepared by Mr. Mortimer Lamb, for criticism.

SUMMER EXCURSION. C.M.I. 1908.

Time Table.

August 24. Leave Quebec in afternoon.
25. Arrive Sydney, midnight.
26. Visit Dominion Iron & Steel Company's works and Dominion Coal Company's mines (arrangements to be made by The Nova Scotia Mining Society).
28. Stellarton, 7.20 a.m.
29. Return, via St. John to Sherbrooke.
30. Arrive Sherbrooke 5.30 a.m., and leave for Thetford by Quebec Central.

Sept. 1. Leave Sherbrooke by C. P. R. at 3.30 a.m. arriving in Montreal at noon.
2. Leave Montreal for Toronto 10.00 p.m.
3. Arrive Toronto 7.00 a.m., leave for Niagara Falls.
4. Reception and entertainment of visitors in Toronto by the Directors of the Toronto Exhibition. Leave Toronto 11.30 p.m. for North Bay.
5. T. & N. O. train for Cobalt.
6. Leave Cobalt 5.00 p.m. (?) connect with train, at North Bay 10.35 p.m. Arrive Sudbury 12.50 a.m.
7. Arrive Sudbury 12.50 a.m.
8. Moose Mountain (?) Port Arthur (?).
9. Leave Sudbury 5.35 a.m.
10. Arrive Winnipeg 9.50 a.m., leave 11.50.
11. Arrive Medicine Hat 11.40 a.m., and proceed to Lethbridge by special train. Leave for Frank in the evening.
12. Visit Frank and Blairmont.
13. Fernie.
14. Special train leaving early in the morning for Moyie. Leave 1.55 for Kootenay Landing. Arrive in Nelson 7.15. Arrive Rossland midnight.
15. Rossland mines.
16. Leave Rossland 8.40 a.m. Arrive Smelter Junction 9.35. Leave Trail 7.20 p.m. Arrive Nelson 10.30 p.m.
17. Visit Bonnington Falls, etc., and reception at Nelson.
18. Leave Nelson 9.45 a.m. Arrive Grand Forks 2.50 p.m. Arrive Greenwood 4.25 p.m. (visits to the different mines in the Boundary district will necessitate chartering a special train).
20. Leave Greenwood (?) 3.20 p.m. Arrive West Robson 11.05. p.m.
21. Arrive Arrowhead 1.00 p.m. Arrive Revelstoke 2.45 p.m.
22. Arrive Vancouver 1.30 p.m. Arrive Victoria 8.30 p.m.
23-24. Meeting Victoria.
25. Arrive Vancouver 8.00 a.m. Leave Vancouver 3.15 p.m.
26. Arrive Banff 10.00 p.m.
27. Leave Banff 10.00 p.m.

Oct. 1. Arrive Montreal 8.25 p.m. Arrive Quebec 3.20 p.m.

BOOK REVIEWS.

A Treatise on Mine-Surveying, by Bennett H. Brough, Thirteenth Edition, revised. Pages XVI + 372. Price, cloth, 7s. 6d. Charles Griffin & Company, Limited, Exeter street, Strand, London. 1908.

As indicated on the title page, Mr. Brough's volume has passed through thirteen editions. This, in itself, is evidence that the book occupies an important place as a standard text book.

The first chapter is general. The importance of mine surveying in its relation to the industry is dwelt upon and a practical classification of mineral deposits, for surveying purposes, is given. For instance, under "tabular deposits" are included mineral veins, beds and seams. "Irregular deposits" comprise masses, stockworks, and pockets. The former class is defined as those in which two dimensions predominate.

The second chapter takes up the measurement of distances and describes the chain, the rod, steel-bands, needle surveying are treated in two chapters. The German dial, invented in the seventeenth century by the measuring wheel, pacing it. Needle and fixed Balthasar Roessler, is the subject of Chapter VII. It is noted that the use of the dial is becoming much less common and the theodolite is gradually replacing it. It is still found useful in narrow workings.

The theodolite (or transit) and its use underground and on the surface are set out in Chapters VIII, IX, and X. Chapter X includes specimen field notes of the survey of an American mining claim.

In discussing mine plans, reference is made to the accuracy of the inspection plans required by law in the Pennsylvania anthracite districts. These maps are on a scale of 100 feet to an inch. The working maps are usually on a scale of 200 to 300 feet to an inch. Topographic and culture features are shown in different colors of ink. The survey lines are plotted with a vernier-protractor, or a protractor of very large size, and the results are checked by latitude and departure calculations.

In Belgium and in France mine plans are required by law to be laid down on a scale of 1 : 1000. In Prussia the scale varies from 1 : 500 for metalliferous mines to 1 : 1600 for collieries. Colliery plans in Great

Britain must not be less than 1 : 2500. In Pennsylvania the scale of plans for anthracite mines is 1 : 1200. The Swedish Mining Act demands that all plans and sections must be drawn on a scale of 1 to 800, and must be made in conformity with a Normal Map, drawn up by the Mining Department.

A chapter on magnetometric surveying, in which the various types of magnetometer are fully described, is followed by a section on photographic surveying and its application to mining work. The use of photographic methods in the Yukon, in the Kootenay mining district, and in the Crow's Nest coal country is cited.

Two appendices, the first giving 163 examination questions chosen from British papers and the second presenting a bibliography of the principal treatises published in mine surveying, conclude the volume.

Naturally this last edition is an improvement on its predecessors. Throughout the volume there is diffused much general information. Practice in foreign countries is given due notice.

Diagrams are interspersed lavishly through the text. The few half-tones that appear are not excellent.

Mines and Minerals of the British Empire, by Ralph S. G. Stokes, Late Mining Editor, "Rand Daily Mail," Johannesburg, S. A.—Demy, 8 Vo. Numerous Illustrations. Price 15s. net. Published by Edward Arnold, 41 & 43 Maddox street, London W. 1908.

In his tour of the British Empire, Mr. Stokes covered more than 35,000 miles. Only twice did he touch foreign territory. Only once was he within one hundred miles of any important mining field that was not on British soil. The journey was undertaken on behalf of the Mining World, of Chicago, and a group of British dailies. Much of the material now cast into permanent form appeared in the shape of articles during the author's pilgrimage. But by the co-ordination of these articles and the addition of supplementary information, Mr. Stokes has produced a readable and intrinsically valuable volume.

We welcome anything that tends towards establishing bonds of sympathy between workers in the various countries that make up the British Empire. Indeed, we hope some day to see an Imperial Mining Institute with branches all over the globe and headquarters in an airship. Until there are regular currents of communication and constant interchange of ideas between English speaking mining districts, progress will be uneven and often slow.

The fundaments of Mr. Stokes' book are sound. To treat the mines and minerals of the British Empire as a whole is a large and bold idea. To complete the task creditably in one volume argues clear prospective, strong judgment, and much labor.

Not as a newspaper "copy-mill" does Mr. Stokes take up his work. Being a practising mining engineer himself, he has been able to observe and describe the things that most interest his technical brethren. As an experienced journalist he has given us his observations succinctly. Geological, mineralogical and other technical details are given their proper value in relation to economic, political, and social conditions. Herein, perhaps, lies the chief merit of the book before us and, therefore, the principal result of the journey.

It is out of the question to attempt a complete review of the ground taken up by the author. But it will be more profitable, because less wearisome, to single out a few characteristic sections and confine our attention to these.

Starting from South Africa, Mr. Stokes' pilgrimage led him through Ceylon, famous for its graphite and gems, through the Indian Empire where mica, manganese, coal, gold, iron, and almost the whole gamut of commercially important minerals are found, through the Malay States whence comes the world's principal supply of tin, and where, as in India, devices as old as civilization are used side by side with modern machinery. Thence his way was taken through the gold, copper, silver-lead and zinc fields of Australia, the gold, copper and tin districts of Tasmania, the gold and coal of New Zealand, and Canada from British Columbia to Quebec was covered last.

Amongst the serious gaps in his itinerary the author notes Mysore, Queensland, Klondyke and Rhodesia. We must add to these another omission, unmentioned by Mr. Stokes. Nova Scotia is given but incidental notice in the volume. It was not visited, nor is apology offered for the scant paragraphs with which its magnificent coal and its historic gold and iron areas are dismissed. This serious hiatus, due no doubt to hurry and lack of time, should have been specifically explained in the preface. We may pardon Mr. Stokes for not visiting the Klondyke, but it is hard to imagine a sufficient excuse for not including Nova Scotia in his itinerary.

Introductorily the magnitude and vital importance to the Empire's mining industry is emphasized by means of tabular statements and a few crisp paragraphs.

"The prospector's memorable decade of 1882-1891 (the first five years of which saw the birth of the Rand, Mount Morgan, Sudbury, Waihi, and Broken Hill)," is contrasted with the past decade.

"The influence of the mining industry upon the growth and welfare of the British Empire is most fully exhibited by the history of the several colonial territories which it has raised to the forefront of commercial nations from the obscurity of sterile wilderness." Applying this dictum to Canada we find that it needs modification. It is true that, but for the gold of the Yukon, that territory would be yet terra incognita. But in Nova Scotia, in Quebec, in Ontario, in Alberta and in British Columbia, the industries of mining, lumbering and fishing are carried on often in the same district. The conformation of Nova Scotia's coast line is such that but few of her important mines are more than a dozen miles from salt water and good harborage. The mines of that province and of Quebec are drawn to a considerable extent from the agricultural class. There is hardly a mining district in Ontario in which farming is not actively pursued. Throughout Alberta and Britsh Columbia the same favorable climatic and physiographical conditions obtain. Canada is blessed with a total absence of those sterile wildernesses of which, in other countries, mineral wealth is the only saving feature.

The annual mineral yields of the British Empire aggregate the tremendous total of, roughly, $1,000,000,000. "In whatever direction" writes Mr. Stokes, "and to whatever degree the popular conception of its financial aspect may be at fault, the mining industry unmistakably appears in a light that is favorable without

reservation as a field of employment for highly remunerated workmen, and the support of the most prosperous laboring communities in the British Empire."

Chapter I is a cursory view of mine labor in widely separated parts of the Empire. The Sudbury labor position is remarked upon as being "industrially sound, but political deplorable." It "reflects one of the ugliest features of Canada's liberal immigration policy." Day's pay for skilled labor ranges from $2 per day, the rate obtaining in Bendigo and Ballarat, to $5 per day in the Gold Coast mines of Western Africa. Canadian rates are uniformly higher than those of any other British country.

As we read chapter after chapter we come upon other themes most worthy of expansion. For instance, the financial assistance given to deserving mining ventures by the Victorian and Western Australian governments should indicate a line of action for Canadian administrations. Under the Mines Department Act the Victorian government advanced a company (that had already expended $1,000,000, on plant and operations) the sum of $40,000 for additional prospecting, at the same time demanding repayment of the first profits and securing itself by a mortgage on the lease and one of the company's plants. In Western Australia there are twenty-nine state batteries and twenty-four state cyanide plants. The treatment charges are so regulated that the year's current expenses for the whole state are approximately balanced by receipts. The system has its defects, but undoubted good has resulted in the speedy development of new districts.

The government of New Zealand, in 1901, reserved 8,000 acres of coal land near Greymouth (South Island) for state operation, These, under the direct control of the Minister of Mines, have been financially successful. The miners are registered as an industrial union and work is carried on under an agreement entered into by the union and the manager. The government has encouraged its employees to build homes for themselves on reserved portions of the township. However, Mr. Stokes assures his readers that the nationalization of the mining industry is "still far below the political horizon."

The marked increase in the scale of milling operations on the Rand gives food for thought. In December, 1898, there was not one plant milling over 50,000 tons per month. There was but one milling between 40,000 and 50,000 tons. But, of 62 plants, 42 were handling under 10,000 tons. Contrasting strongly with this is the record for December, 1907. In that month there was one plant of over 50,000 tons, four between 40,000 and 50,000 tons, and only 14 of 10,,000 tons capacity. Whereas plants dealing with more than 20,-000 tons per month constituted only 9 per cent of the total in 1898, they now represent 97 per cent.

In the columns of the "Canadian Mining Journal" the metallurgical progress of the Rand has been noted and analyzed on several occasions. Mr. Stokes makes clear presentation of the principal operating causes of this progress. All of his chapters on the Rand, indeed, are notable, but space will not permit of further notice here.

Of Canada Mr. Stokes shrewdly remarks that it has as yet failed to win a lofty place as a mining country, not because of mineral poverty, but because its energies have always been applied to the exploitation of its agricultural resources. The dissimilar methods of ore-valuation adopted at Ottawa and by the provincial departments are commented upon.

"A particularly favorable feature of Canada as a mining country is the lack of excessive centralization; its productive fields are diverse in character and wide in distribution. Amongst the mineral occurrences are the greatest deposits of nickel, asbestos, and placer gold, and the richest silver field in the world."

Nova Scotia's gold mines are thus spoken of: "The cause of the field's retrogression is more freely attributed to inefficient mining methods, to the unsound influences of granting small mining areas, and to the lack of any laws compelling holders to operate their mines, than to the deficiencies of mineralization."

The free circulation of the careful and trustworthy maps and reports of the Geological Survey is the subject of favorable comment.

Mr. Stokes' chapters on Cobalt, Sudbury, Quebec and British Columbia will stand inspection even by a Canadian mining man. They are not beyond criticism, but they are clear, incisive and honestly descriptive.

We would willingly dilate further upon the "Mines and Minerals of the British Empire." but we must respect the reader and bow to the printer. It may, however, be permitted to conclude by offering Mr. Stokes our warm felicitations upon his courage and vigour in successfully attacking so large and imperial a theme. From those of our readers whose privilege it may be to read the book we invite comment and criticism. This we do because we believe that it will at once assume a niche in every well conditioned library.

Hints on Amalgamation and the General Care of Gold Mills—by W. J. Adams, E.M. Illustrated. Second Edition, Revised and Enlarged. &120 pages. Price $2. The Mining and Scientific Press, San Francisco, 1908.

Ten years ago the first edition of this book was brought out. Years before, coming to California as a young mining school graduate, the author soon discovered that his technical education had only taught him chemistry and scientific mechanics in general. He lacked practical rules for the application of his knowledge. His real education then started at the bottom of the ladder in a gold mill. These rules, the result of "bitter experience, extending through many years." he set down in this little volume.

Now, ten years after the first writing, another edition has been brought out. Very few changes have been made in the text, but an appendix deals with the more salient changes in gold milling.

The book iwsritten by a practical man for practical men. It will, no doubt, fulfil its mission.

A Dictionary of Spanish and Spanish-American Mining, Metallurgy and Allied Terms—by Edward Halse, A.R.S.M. 380 pages. Price 10s. 6d. Charles Griffin & Company, Limited, Exeter street, Strand London, 1908.

Griffin's Mining Series has long been known to mining men. This recent addition will prove quite as useful as its predecessors.

The impression exists that Spanish is an easy language to acquire. This impression is modified when the young engineer, who has neglected to include Span-

ish in his studies, finds himself obliged to pick up a working knowledge within the least possible time limit. To one in such a predicament and, indeed, as a useful companion to the practising engineer whose reading or whose engagements bring him in touch with mining in Spanish-speaking countries, the dictionary should be a boon.

As in German, French, and Italian, so in Spanish dictionaries, it is wonderfully difficult to find the technical terms that one needs. And if these terms happen to be colloquial variants of standard words, the search is all the more hopeless.

In this dictionary all provincial terms are referred back to standard terms. In some instances lists of synonyms and equivalents in French, German and in some instances, Portugese, are given.

While Mr. Halse's dictionary is by no means the first of its kind, it is, perhaps, the most complete and useful.

INDUSTRIAL PAGE.

Underground Wire Rope Haulage.—The Broderick and Bascom Rope Company, St. Louis, Mo., U. S. A.— This most creditably done pamphlet tells of the successful application of underground rope haulage in the workings of the Coal Valley Mining Company at Sherrard and Cable, Illinois. The illustrations are exceptionally good. The letter press could hardly be excelled.

An outline of the three general methods of wire rope haulage is followed by a description of the tail rope systme in use in the Coal Valley mines.

At the Cable mine a tail rope system extending into the workings for a mile and a half was the means of immediately doubling the output at one-half the cost of the old operations. This was possible despite the heavy grade of the main tunnel.

A comparison of mule haulage and wire rope haulage, shows that the costs of installation are about the same. But there is a daily saving in favor of the wire rope system on an output of 1,000 tons per day, of $130.

Bulletin 1062, Allis-Chalmers Company, Milwaukee. —The principle feature of the equipment of the Milwaukee Northern Railway is the fact that the motive power of the road is furnished by gas-engine-driven electric generating units of a size heretofore unknown for purely traction service.

The total completed trackage is 30 miles in length and 82 miles are yet to be completed.

The power house at Port Washington, Wis., is situated on the water front. Two buildings, one for the producers and one for the engines, generators, switch boards and protective apparatus, make up the power plant proper. Both buildings are of concrete, steel, and brick and are fifty feet apart. The gas supply main is run outside and along the entire length of the power house from the producer plant.

The generating units are three in number, each of 1,000 kw. capacity. Each unit consists of a twin tandem horizontal double acting Allis-Chalmers gas engine direct connected to a 405 volt 25 cycle Allis-Chalmers alternator. Both engines and generators were designed with large overload capacities, the engine being capable of developing upwards of 2,000 h.p., and the generator having a corresponding capacity. Each engine has four cylinders, 32 inches in diameter by 42 inch stroke, and operates at 107 revolutions per minute.

The valve gear is of the standard Allis Chalmers cut-off type and the engine operates with constant compression, insuring smooth running under highly variable loads.

The engines, being twin tandem, will start from any position. All wearing surfaces are arranged for a continuous oiling system, and the cylinders are lubricated by carefully timed admission of the cylinder oil.

The distinctive features of the engines are the extreme simplicity of design, the solidity of construction, and the quiet operation.

The gas producers operate on the Loomis-Pettibone system. The gas is delivered into a holder of 30,000 cubic feet capacity. The normal rating of the present plant is 4,00 h.p., and it has a capacity of 25 per cent. overload for five hours' duration.

Hocking Valley bituminous slack coal, registering 11,500 B. T. U., is the fuel ordinarily used. The downdraft principle is used, the air being admitted through a charging door at the top of each producer. The volatile matter and distillates are thus drawn through the deep bed of incandescent fuel and gasified. Gas is obtained containing 80 per cent. of the heat units possessed by the fuel. Reverse runs of steam are occasionally made for the purpose of breaking up the fuel bed.

The electrical features of the equipment are briefly: Three phase current is generated in the power house at 405 volts and 25 cycls by direct coupled alternating current generators, each of 1,000 kw. normal capacity. These machines are of a special type developed by Allis-Chalmers Company for use with gas engines.

A New Coal Mining Machine For Low Veins. For several years the use of the Sullivan Continuous Cutting Electric Chain Coal Mining Machine has steadily increased, as operators in various fields of this country have learned to appreciate its advantages. The success of this type has been such as to warrant the development of a similar machine for mining coal, both in rooms and on long wall faces, in thin seams.

The Sullivan Low Vein Room and Pillar Mining Machine, designated as "class CE-6," is mounted upon a steel shoe or frame for convenience in transportation and for making its first cut. In making the first or rib cut, the machines moves forward out of this frame, which is cut away at the left-hand side. The rear or anchor jack is then set in the right-hand corner of the room, at the other extremity of the working face. The machine propells itself across the face on a feed chain stretched between these two jacks, cutting the entire room at a single operation. The accompanying illustration shows the machine in the above position, with the two jacks referred to.

It will be noted that the machine travels on a sheet steel plate, occupying the least possible space. No rollers or rails are required on which to run the machine while making this cut. It will also be noted that this is virtually an adaptation of the long wall principle to room work. The machine is not withdrawn from the coal and moving it over by hand for the next cut; but as there is no frame or pan behind the machine, as in the case of the breast type, it occupies but one-half as much space as the latter in front of the coal, thus allowing props to be permanently set within six feet of the face, and reducing the distance which the coal and

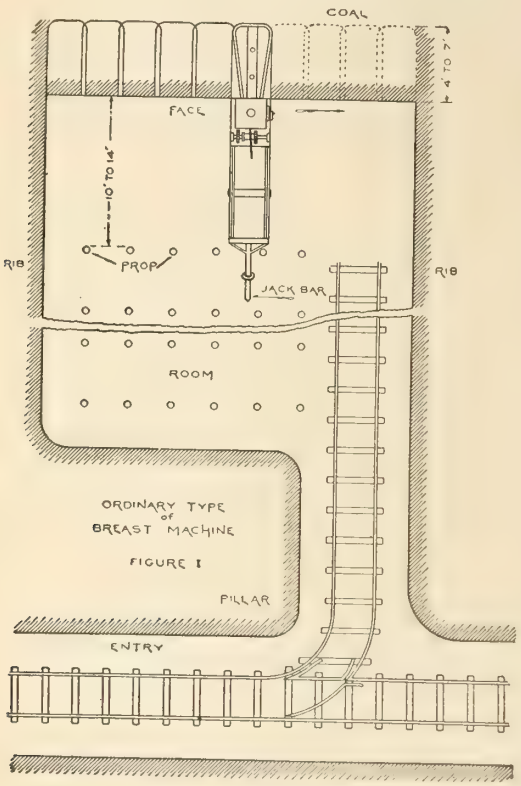


FIG. 1.

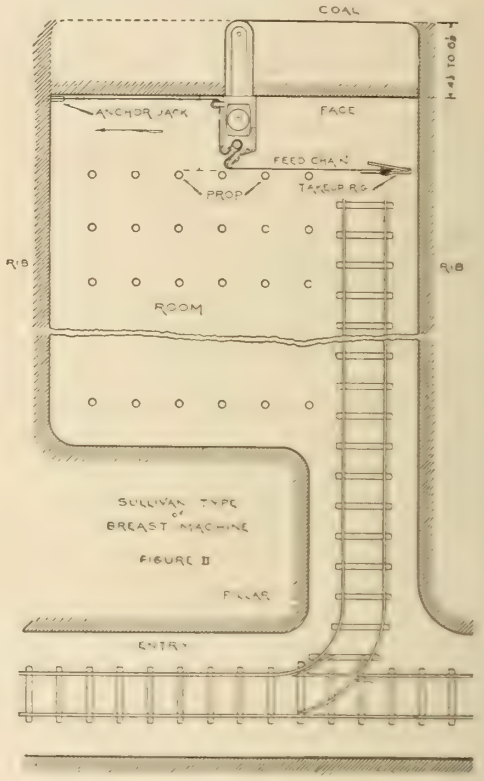


FIG. 2.

FIGS. 1 AND 2—SHOWING METHOD OF MINING COAL IN ROOMS WITH BREAST MACHINES AND WITH SULLIVAN COAL CUTTER



FIG. 3.

SULLIVAN CONTINUOUS COAL CUTTER AT THE END OF THE FIRST OR SUMPING CUT

coal after making the first or sumping cut, until the left rib is reached.

This method accomplishes notable economies in mining and in handling the coal. Not only is much time and labor saved that is ordinarily employed in backing the ordinary type or breast machine out from the machine cuts on the bottom, at all times closely following the contour of the floor, no coal is left after it, to be raised by hand, nor are sprags or ribs left at the rear of the cut to interfere with blasting to the best advantage.

The machine has been carefully designed to secure

strength, durability and at the same time low height and compactness of the working parts. The motor is debris must be moved by the loaders. As the Sullivan placed horizontally instead of vertically, as is usual in the ordinary machines of this type, and is wound for 210, 250 and 500 volts, direct current, as required by and the power truck 900 pounds. The motor develops 30 horse-power at 1,125 r.p.m.

This coal cutter has proven very satisfactory to operators on account of its high cutting speed, from 16 to 39 inches per minute, small bulk and ease of manipulation and carriage. It is capable of operating on



FIG. 4.

SULLIVAN ROOM AND PILLAR MACHINE, MAKING CONTINUOUS CUT ACROSS THE FACE OF A ROOM.

mine conditions. When cutting, the machine stands 21 inches high and occupies a space of five feet three inches between the coal and props. The kerf or height of mining is four and one-half inches, and the depth of cut ranges from 63 to 75 inches. The machines is moved from place to place in the mine on a special self-propelling electric trunck. When on this truck the pitches of 30 degrees when rooms are driven across the pitch, and of 12 degrees when rooms are driven straight up the pitch. As indicating the capacity of this type, it may be mentioned that at the mines of the Gay Coal & Coke Company, Logan County, West Virginia, a Sullivan Class "CE" machine has undercut, on a long wall face, 377 feet to a depth of six feet one inch, in eight

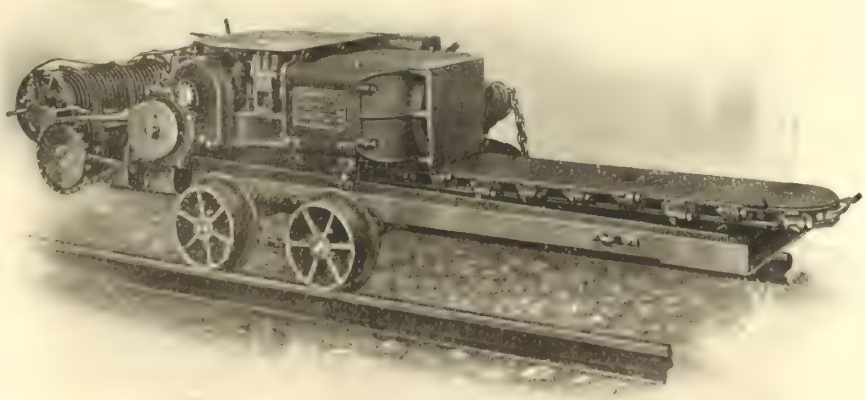


FIG. 5.

SULLIVAN LOW VEIN ROOM AND PILLAR ELECTRIC CHAIN MINING MACHINE ON POWER TRUCK FOR TRANSPORTATION FROM ROOM TO ROOM.

machine stands 30 inches above the rails, although if desired, a truck is furnished with drop axles, reducing the total height to 27 inches. The machine performs all operations under its own power, including loading and unloading from the truck, so that hand labor is reduced to the minimum. The machine weighs 3,100 pounds, and one-half hours, thus producing over 500 tons of coal. While these machines naturally make a better showing in wide rooms, experience has shown that they are also much more economical than the breast cutter in narrow rooms and even in entries.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

Outputs of Dominion Coal Company for May:—

No. 1	49,399
No. 2	65,594
No. 3	36,271
No. 4	36,759
No. 5	49,623
No. 6	22,544
No. 7	3,749
No. 8	19,851
No. 9	34,770
No. 10	14,028
	332,588

In its issue of the 1st inst., the "Halifax Herald" gives prominent place to a letter signed by H. C. McKenzie of Stellarton, throwing doubt upon the bona fides of the award of the Board of Conciliation under which the miners of the Dominion Coal Company are now working, and intimating that the members of this Board foisted upon the P. W. A. an arrangement which is really a decrease in their wages, while maintaining to the Government and the country at large that it was an increase of somewhere in the neighborhood of $70,000 per annum. This same gentleman makes several statements supported by figures borrowed from the Annual Mines Report, which by the way covers an entirely different period from that covered by the award under discussion, and by a process of dwelling on the concessions given by the P. W. A. and a slurring over of the increases granted by the Coal Company, he succeeds in presenting just that sort of mischievous misrepresentation of facts that impresses the superficial reader. His statements are, however, utterly untrue in every instance, there being not even one that cannot be directly traversed and categorically contradicted. The facts are these. After allowing for the increased price of house coal, the increased price of powder and the decreased pillar rate, the net gain to the men is between $6,,000 and $7,000 per month, or at the lowest computation $80,000 per annum. We have these figures officially from the Coal Company's officials, and they are facts, not malicious fiction. The true inwardness of Mr. McKenzie's tirade comes out when he falls foul of the Lemieux Act, because, forsooth, it is "a creation of the present Government" and of the Grand Secretary of the P. W. A. because he voted for a certain political party. We often wonder whether there is anything in Canada, in business, religion, citizenship, or social intercourse, anything in heaven or earth that is not tainted with politics. It always creeps out, and in the most unexpected quarters. We feel inclined to echo the Gilbertian couplet, that:

It really is astonishing, how nature doth contrive
That every little boy and girl, who's into this world alive,
Is either a little Liberal, or else a little Conservative!

What W. S. G. would have said had he lived in Nova Scotia it would be interesting to know. We recommend Mr. McKenzie to read Psalm 80, sixth verse.

Some very interesting figures are to be found in an editorial in the "Colliery Guardian" of the 22nd inst. which are somewhat disconcerting to those who claim that a diminution of accidents could be effected by a curtailment of the hours worked, or put it the other way, that accidents are more numerous in the closing hours of work than in those of the commencement of work. The following figures are given by Mr. John Gerrard, for many years the Chief Inspector of the Lancashire Coalfield in England. The editorial makes the following remark, which is somewhat apropos of the statements that have been made recently in the local press as to the hours worked in Nova Scotian coal mines. One writer to the local press stated among other wild and whirling words, that the Nova Scotian miner had the unenviable distinction of working the longest hours of any men "outside of the Siberian convicts." The Guardian says: "In Lancashire, the men usually begin to descend about 6 p.m., meals are mostly taken between twelve and two o'clock, at which hour, at a few pits, the men are allowed to ascend; not many, however, avail themselves of this facility to limit their work to eight hours, and the winding of men, in the majority of cases begins about three o'clock." The figures given by Mr. Gerrard are as follows:

NUMBER OF ACCIDENTS.

Hour of Shift	1901	1902	1903	1904	1905	1906	Total	Per cent. of Total
1	19	21	18	24	26	18	126	13.4
2	15	14	16	20	18	27	110	11.7
3	16	11	20	244	18	14	103	11.0
4	20	15	15	18	14	24	106	11.3
5	15	14	22	21	18	18	108	11.5
6	20	20	22	15	16	29	122	13.0
7	15	12	17	17	11	17	89	9.5
8	14	20	11	18	21	18	102	10.9
9	12	10	6	6	10	10	54	5.8
10	1	2	5	2	4	4	18	1.9

The conclusions arrived at from the study of these figures are that the most dangerous hour is the first in the day. This is what one would expect in a mine. The sixth hour appears to be one that has a large proportion of accidents, and after that the proportion decreases. It is therefore very apparent that the bulk of accidents in mines do not occur in those hours which the advocates of the Eight Hours Bill claim to be the ones most dangerous to life, because of the fatigued state of the workers, but they occur before the seventh hour. The Guardian also quotes extensively from some figures compiled by one of the leading indemnity associations in England, which show the same result as Mr. Gerrard's figures, and both of them agree in the peculiar fact that the hour from 11 to 12 a.m. is the one most prolific in accidents. The records of the indemnity company show that this hour is much more dangerous than the first hour of work. The Miners' Eight Hour Day Committee in their report state that they "have failed to obtain any evidence which would associate the number of accidents in any disproportionate degree with the hours in excess of eight spent underground by them, or the districts in which the longest hours are worked." The Guardian points out that there is a real danger if men work to a point at which their perceptive faculties begin to flag and thereby are rendered less acute in detecting danger, but that there is no real evidence to show that this point is reached in a mine within a period of eight hours.

The output of the Dominion Coal Company for May was over 330,000 tons, making their total output to date 250,000 tons in excess of the same period of 1907.

ALBERTA.

Lethbridge.

W. D. L. Hardie, general superintendent of the mines of the Alberta Railway and Irrigation Company has gone east on an extended trip. Mr. Hardie will visit the mines in Nova Scotia where new steel tipples have been erected recently to get in

formation in that branch of engineering. The A. R. & I. Company contemplate the erection of a steel tipple at their No. 5 shaft which is at present being sunk.

Taber.

The Scranton Coal Mines Company Limited with headquarters at Spokane, are opening up a new mine on their property recently acquired. The vein which it is proposed to work is 42 inches thick and is a high grade lignite. Six men are employed driving a tunnel to the cove and the proposition is under the charge of Mr. W. J. Reynolds, mining engineer of Spokane.

In the Supreme Court before Mr. Justice Scott and jury, Joseph Tinsley of this town was awarded $3,152.80 damages against the Canada West Coal Company of Taber, for injuries received in an accident in the mine in August of last year. The plaintiff had his leg broken by a run-away mine car on the tipple of the Canada West Coal Company's mine.

Coleman.

As already reported the strike at Coleman was short lived and there has been no further trouble. Forty new coke ovens will be erected as soon as possible and it is the intention of the International Coal and Coke Company to still further add to their ovens in the near future.

SASKATCHEWAN.

Saskatoon.

The prospecting operations which have been in progress all winter and spring at Eagle Lake have in the meanwhile been stopped. It will be remembered that these operations were carried on by the Provincial Government with a view to finding a cheap and convenient supply of coal for the settlers in the Eagle Lake district. Several trial shafts were put down and coal was found in almost every case, but the veins found were not thick enough to allow of economical working. The expense of timbering was very heavy as the coal vein was overlaid by a soft clay, which required very close timbering to hold up. All timber had to be hauled by wagon for about 90 miles as there is no growth of suitable timber on the prairie in the neighborhood.

It is supposed, however, that there are other veins of coal in this district and it is the intention to continue boring operations at some future time.

Bienfait.

The result of the meetings of the Board of Arbitration appointed under the Lemieux Act to investigate the grievances of the miners employed at the Western Dominion Collieries Company has been that an agreement has been arrived at between District No. 18 of the U. M. A. of A. and the Colliery Company.

A schedule of rates for all classes of labor, both above and below ground, has been agreed to, while contract miners' rates remain the same as at present. The company agrees to the check off system and full recognition of the Union. The question of the price of supplies has also been satisfactorily arranged. Judge Myers acted as chairman while J. R. Crowe represented the company and Frank Sherman the miners.

The investigation under the Lemieux Act, before Judge Dawson touching the miners and the Manitoba and Saskatchewan Coal Company, is still proceeding.

BRITISH COLUMBIA.

Hosmer.

Work is being steadily pushed ahead at the mines and every one is looking forward to the 1st of January of next year at which date the company's agreement with the Crow's Nest Pass Coal Company expires and coal can be shipped.

A large force of men are employed on the coke ovens, but, owing to a dispute with some of the men employed on the ovens, work was delayed for a short time.

Michel.

There has been considerable trouble at the Michel mines recently. A miner by the name of Marchant obtained a job from the pit-boss of No. 8 mine, and received an order for his tools, supplies, etc. When he presented himself for work he was told that his place had caved. Marchant then reported to the Union Committee, who interviewed Mr. Derbyshire, the manager, and Marchant was again refused work. A special meeting of the miners was then called and a vote taken to suspend work until Marchant was given a job. Immediately after this, President Sherman of District No. 18, U. M. W. of A., arrived in Michel and made inquiries why he had not been informed of the suspension of work. The Michel men told him they intended to fight the matter out their own way. The president then pointed out that they were breaking their agreement.

The following day summonses were issued against Chas. Garner, Jas. Douglas and Wm. Whitehouse of the miners' committee, for a breach of the Lemieux Act in inciting the men to strike. These three men were tried before a Justice of the Peace, and the cases dismissed on th grounds that the J. P. had no jurisdiction in this matter.

It was expected by the men that the Fernie miners would strike in sympathy, but these latter continued to work. Eventually another meeting was held and the men decided to place the matter in the hands of their district officers and return to work.

Mr. Hurd, the general manger of the Crow's Nest Pass Coal Company, insisted that the men return to work before he would consider their grievances and sent the District Union the following letter:

President of District No. 18, U. M. W. of A.

Dear Sir:—On the evening of May 15 th, 1908, Jas. Douglas, president of the Michel Local, Chas. Garner, secretary of the same, and Wm. Whitehouse, member of the Grievance Committee, Michel Local, waited upon Mr. Derbyshire, superintendent of our Michel Colliery and requested that employment be given to Henry Marchant.

Upon being told by Mr. Derbyshire that no employment would be given to the said man, he informed Mr. Derbyshire that he would be given until Saturday evening to employ Marchant and if the same was not done there would be no work on Monday. Mr. Garner further said that the mine would lie idle till Marchant got the job.

Without notice further than the above the men refrained from work this morning, and apparently are out on strike. In this connection I am advised that Mr. Marchant is not an employee of this company and that he has not worked for this company for a period of five years and that the sole reason for refusing to employ him is that in the opinion of Mr. Derbyshire, he is not a competent miner.

I beg to call your attention to the terms of the agreement under which our mines are now working and made between this company and other members of the Western Coal Operators' Association and our employees, represented by the United Mine Workers of America, District No. 18, made May 4th, 1907, and represent that the action taken by the men at Michel is entirely contrary to the above agreement, and ask that you take the steps necessary to enforce the carrying out of the agreements in question on the part of the employees of this company whom you represent.

I assure you that these agreements were made in good faith by this company, and that expecting on our part to

carry them out in absolute good faith, we must look to the United Mine Workers of America, District No. 18, as sole representatives of our employees and the people with whom the agreements under which we are working were made, to do the same.

We are at all times ready to consider as provided in the agreements mentioned any grievances of our employees.

Yours truly,
The Crow's Nest Pass Coal Company.
per J. D. Hurd, general manager.

The following circular was issued by James Douglas and Charles Garner of the Michel Union of the U. M. W. of A.: "The Crows' Nest Pass Coal Company issued notices requesting the miners at Michel to resume work at once stating that they are now as before, willing to settle any trouble in the same liberal manner as heretofore. What stupendous magnanimity! The present suspension is simply a climax of a pin-prick policy pursued by the Coal Company's officials. Human tolerance has a breaking point. The company's officials have during the financial crisis humiliated and degraded the miners almost beyond endurance. They have cheated and told lies in the transactions between themselves and the Local Grievance Committee. Just now they have deliberately insulted the organization by an act of discrimination of the vilest and most flagrant kind. . . . . We are told that under the Canadian Labor Law, that we are liable. We claim that it does not cover our case and if it did we will greak any law in the constitution that encroaches upon our liberties. What law shall state, what line of demarcation has been fixed to define where liberty ends and where slavery starts? If a man is to be called upon to give his name why not call upon him to furnish a certificate of good conduct from the minister with a guarantee of his being meek and humble.

The Coal Company would transplant Russian methods in Michel, they will be successful when the men are starved out. If this condition prevails much longer we will call upon our brothers at Coal Creek and Fernie to take action in sympathy with us. We believe, however, that when General Manager Hurd is made cognisant of the true state of affairs this matter will be settled satisfactorily to both parties.

(Signed) Jas. Douglas, President.
Chas. Garner, Secretary.

Michel Local Union, No. 2234.

The following circular has been issued by the Union officials for the district:

To the members of Michel Local Union, U. M. W. of A. greetings.

A circular having been issued by Jas. Douglas and Chas. Garner of Michel Local, setting forth their position we deem it advisable to state the position of the District Union upon the dispute at Michel.

The action of the men at Michel in suspending work without first giving the District officers an opportunity of endeavoring to settle the matter as provided by the International constitution of the U. M. W. of A., is a wilful violation of the constitution also a breach of their agreement with the Crows' Nest Pass Coal Company. On behalf of the U. M. W. of A., we request the men to resume work and observe that the matter in dispute be handed the District officers for settlement. We have always been ready to take up any matters in dispute at Michel when properly placed in our hands and are so to-day. We have been denied that opportunity at Michel.

We again call upon loyal members of our organization at Michel to resume work and place their disputes in our hands.

Yours fraternally,
F. H. Sherman, President.
J. A. McDonald, Secretary.

The Michel mines produce about 2,000 tons of coal per day and as most of the coal is used for coking any stoppage at the mines lays a lot of men off work.

After the above circular had been issued by President Sherman, the men returned to work, but again went on strike, owing to twelve men having been discharged. The company claim they were discharged because they were off for two days without permission which is in accordance with Article No. 10 of the agreement.

A mass meeting was called at Fernie in the Opera House, where the miners, acting on the advice of President Sherman, passed an unanimous resolution advising the Michel men to again resume work and place the matter in the hands of the district officials and stating that if the Michel men could not then get justice, they would be supported by the treasury of the Fernie members. The Michel men called another meeting and decided to abide by the advice given.

Rossland.

The ore shipments from Rossland for the week ending May 23rd amounted to 4467 tons, including a 35 ton shipment from Giant-California. The industry is in a healthy condition in this district and the mines are all looking well. The gross output of the Le Roi for April was valued at $90,000 and the mine has much good ore in sight at the present time. Work at the Centre Star mines is proceeding along regular lines, their shipments running from 2,700 to 3,000 tons per week. Ore is being taken from the Danby Fraction, controlled by the Spitzee Company, and the St. Elmo has also bee nleased. There is some fairly good ore opened up in the St. Elmo, which is situated some 600 feet above Rossland on the side of Red Mountain. Development work continues to be done on the Curlew and in the course of the work they are taking out some good silver-lead ore.

Rossland has been favored by a visit from Dr. J. Bonsall Porter and Dr. J. A. Dresser, of McGill University, who have visited the camp with 35 of the McGill students.

The Le Roi No. 2, Limited, have located an ore body seven feet wide at a point 337 feet below their workings on the 900-foot level. This ore was located by means of diamond drill and carries 19 dwts. gold and 4.5 per cent. copper. It will be noted that this is a higher grade ore than generally found in either of the the other two big mines. This discovery is of more than passing interest to the Le Roi No. 2 Company, as it tends to prove the presence of ore in their property at depth and with two big mines like the Le Roi and the Centre Star adjoining their claims and with plenty of ore at depth it would appear to even a layman that the Le Roi No. 2 will have lots of ore to mine for a long time to come. Ore bodies in the Josie have so far run narrow but there is no good reason why wide bodies of ore should not be opened up at more depth.

W. Y. Williams, consulting engineer for Granby, came up from Spokane to look over the California-Giant work during the week. The White Bear Company is to be reorganized and an assessment levied with which work will be resumed. Some of the shareholders may not feel altogether in harmony with another assessment but now that the mine is almost in a position where it can pay its own way and with all of the other deep mines of the camp making good discoveries of ore it would be a pity to let the proposition go by the board when a small assessment might put it on the upward path.

The receipts at the Trail smelter are running over 4,000 tons per week, including ore from the Rambler-Cariboo, St. Eugene, Snowstorm, Richmond Eureka, First Thought, Crescent and Vancouver.

A meeting of the Mugwump and Monita Mining Companies is to be held in Rossland on June 23rd, for the purpose of winding up the affairs of these companies.

Phoenix.

Ore shipments to the British Columbia Copper Company's smelter were begun on the 18th of May and during the succeeding week 2,000 tons were shipped from the company's mines; 480 tons being shipped from the Denoro property. Things are getting in good running shape in the mines with the exception of a little shortage of first-class machine miners, while common labor is plentiful this class of mine help seems to be scarce, many of the best miners having left the Boundary during the recent shut-down and some of them have moved their families to other camps. Mr. E. G. Warren of the Greenwood Electric Company has been made general foreman of the Copper Company smelter. Mr. Warren is a good man and will no doubt handle his portion of the work in a satisfactory manner.

During the week ending May 30th, the ore shipments from the Boundary mines were: Granby 21,498, Mother Lode 3,510, and Oro Denoro 1,480 tons, making the total shipments from the district for the year to date 452,437 tons. The Granby smelter during the week treated 16,256 tons.

At the Granby smelter the wooden building covering the blowing engines is being replaced by a structure of steel and brick. The ore bins at the Gold Drop, which were on Snowshoe property have been removed and rebuilt at the Curlew. The remaining six furnaces will be connected up to the new flue dust chamber as quickly as possible, but the work will no doubt take two or three months yet.

The tunnel on the E. P. U. which is being worked by local people, has cut through some high grade gold and silver stringers, which would seem to indicate the approach to the lead. A strike of good ore has been made on the Buttercup in Wellington camp. The O. K. in Wellington camp and the Redona in Brown's camp have changed hands.

The McGill students have paid visits to the Phoenix and Greenwood mines during the week being shown all the points of interest. The work of making a geological survey of Phoenix camp is now in progress. This work will prove of invaluable assistance to the mining men of Phoenix.

An official announcement has at last been made that the Dominion Copper Company will start up its plant on June 15. One hundred men will be employed at the smelter and about two hundred at the mines. As the company has retained its staff of officials and there is plenty of coke, etc., on hand, it will not take very long to get things running. The financial condition of the company has been improved, which will greatly aid the local management in its efforts toward greater economy. It did not seem reasonable that the Dominion Company would find it advisable or profitable to remain idle with the other two big Boundary producers running full blast. There is no doubt but that the Dominion Copper Company will be in a position in the near future to produce copper at a much lower figure than they did during their last fiscal year while operating. They can do it if the other big mines and smelters can and no doubt some future report will show this an accomplished fact.

A new company is to be formed in Phoenix to operate the Woodburn and Woodburn fractional claims in Wellington camp. The claims have a good showing of copper-gold ore and have good railway facilities. They are regarded by local men as very promising properties. Work on the Stemwinder in Fairview camp has about ceased and the miners are leaving the camp.

The Tip Top mine in Skylark camp has moved its plant to a new location on its property and will do some work on the copper showing they have on the property.

It is stated by the promoters that all arrangements have been completed with the Phoenix-Greenwood tunnel proposition excepting the bonusing of the project by the city of Greenwood. As there are obstacles in the way of this some delay may be incurred.

The news has been received in the Boundary district with some relief that the strike of the coal miners of Michel had been settled. It was feared for a time that a parallel to the strike situation of last year was about to occur. As it was one or two furnaces had to be blown out owing to a small shortage of coke.

Nelson.

The hopes of the Nelson mining interests are once more turned toward the Silver King mine on the hill above the city, where Mr. M. S. Davys, an enterprising local mining man is working the mine under lease from the foreign interests which control it. The proposition looks promising but some little development work is necessary to demonstrate the presence and permanency of the lead in the lower levels.

It is expected that the Krao will resume work early in June. Now that the Queen mine has been taken over by Minneapolis interests a strong effort will be made to interest outside capital in the Sheep Creek district. There are a large number of promising prospects in this district and twenty cars of ore shipped from there to Trail smelter during the season have averaged around $100 per ton. Shipments from the Standard will be resumed as soon as the roads are in better conditon for hauling. About400 tons are on hand to be sent to Trail smelter as soon as it is possible to ship. On the Surprise work has been resumed on the crosscut which is already 2,500 feet. The news that zinc ore may be shipped to the United States duty free was received by the zinc miners of the Slocan with much gratification. This decision will not materially affect the Nelson Zinc smelter as it will no doubt get its full quota of ore from the nearby mines. The Whitewater mine has made a trial shipment of zinc ore to a Kansas smelter. The Fisher Maiden, in Slocan, which has not been worked for some time is to start work again in the near future. A majority of the stock in this company is held by Spokane interests.

GENERAL MINING NEWS

NOVA SCOTIA.

Halifax.—The agitation in the ranks of the Provincial Workmen's Association for affiliation with the U. MM. W. is to be settled by a referendum vote to be taken on June 24th. The various lodges will appoint their own returning officers and Mayor Douglas of Glace Bay will act as general returning officer for the whole province.

Sydney.—The two coal areas at Little Bras d'Or controlled by G. A. Forbes, of Montreal, and adjoining the territory of the Nova Scotia Coal Company, have passed into the hands of R. S. Cottrell, of Sydney, and W. A. Mackay, of North Sydney.

Halifax.—The invitation extended by the Mining Society of Nova Scotia to the Canadian Mining Institute to visit Sydney next August has been accepted. The Institute members will be accompanied by British and European delegates.

Londonderry.—Work at the mines and smelter of the Londonderry Iron and Mining Company has not yet been resumed.

ONTARIO.

Cobalt.—On Thursday, May 20, a party, including Mr. A. A. Cole, mining engineerfor the T. & N. O., left Cobalt to visit the unsurveyed country south of Lorrain. The Kelly claim was

visited. It was found that but little work had been done on this claim beyond surface trenching and a few shallow test pits. The party also visited the location on the southwest bay, known as "66." This will probably prove to be the best town site.

Thorold.—The smelter of the Coniagas Reduction Company is now in operation. Six cars of Cobalt ore are at Thorold ready for treatment.

Sudbury.—The Crystal Gold mine, near Wahnapitae Lake, has been sold to a Toronto syndicate by P. Shannon of Pembroke. It is reported that mining will be started at once.

BRITISH COLUMBIA.

Rossland.—While loading holes in a slope on the 11 limit of the Centre Star mine, on May 25, Maurice Powers, an old miner and shift boss, was instantly killed by a premature explosion. Powers was using a new explosive called Mitchellite.

Nelson.—Premier McBride, who is also Minister of Mines, visited Nelson on May 23rd.

Phoenix.—Nearly six miles of diamond drilling has been done up to the first of May at the Granby mines, Phoenix. Probably no mine or group of mines in British Columbia has had so many bores made. The work goes steadily on by the Boyle Bros., the contractors, who have done it all for the Granby company for nearly four years. The following figures give exactly what has been accomplished by the Granby company in diamond drilling, the total up to May 1 being 29,117 lineal feet as follows: Previous to 1904, 4,150 feet; in 1904, 3,148 feet; in 1905, 8,419 feet; in 1906,, 9,417 feet; in 1907, 3,983 feet. As boring was stopped in November of last year, when all mining and smelting in the Boundary took a complete rest, the total for 1907 was not very large. Then, again, this sort of work having been recommenced only a few weeks ago, the figures for 1908 will not likely equal those of 1907. For years the company has done its diamond drilling entirely by contract, while the Dominion Copper Company and the British Columbia Copper Company had their own diamond drills and did the work themselves. The latter, however, has been doing more and more of this work by contract of late, having a contract now in progress at its rich Lone Star and Washington mines near Danville, Wash.

Victoria.—The steamer Tees brought from the west coast a sample shipment of ore from the Klaskino Gold Mining Company's inlet. The shipment included half a ton of ore from the shaft. It has been sent to Vancouver for a mill test.

Vancouver.—The Guggenheims have finally abandoned work in Cariboo, and have given up the proposition to purchase the Cariboo Consolidated Hydraulic Company. This decision was reached after a hundred thousand dollars had been spent carrying out the initial work for digging a series of ditches for securing a water supply. The Guggenheims also paid a similar amount to the contractors to be released from the contract to install a water system which in all was to cost half a million dollars. The principal shareholders in the original enterprise are Sir William Van Horne and R. B. Angus of Montreal, to whom the property has now reverted. Sir William Van Horne recently wired instructions to Mr. Hobson to go ahead with the season's work, and preparations are being made for a big clean-up.

Victoria.—Assayers certificates have been granted to W. W. Lindsay, Rosland, and to V. L. Vaughan-Williams, Victoria.

YUKON.

Dawson.—Reports of the discovery of gold and of a stampede come from Log Cabin Creek in the Forty-Mile district. Many applications for claims staked have been received by mail in Dawson. The creek is a tributary of Forty-Mile river, fifteen miles above the Yukon. No grants will be issued until more information has been received.

Dawson.—Reports from the dredging companies indicate that by May 16th all will be in readiness to start the dredges. It is estimated that a combined output of about one million dollars per month will be attained this season. The Lewes river dredge, on 6 below Bonanza, had got steam up on May 6th. The big dredge of the Bonanza Basin Company was thoroughly overhauled last autumn. Her equipment is now operated entirely by electrical power.

Three of the Yukon Gold Company's dredges, two on 104 and one on 96, Bonanza, were expected to be in operation on the 8th of May. They were merely waiting for power from the Twelve mile station and water had begun to run freely in the flume there. The power station itself has been repaired and the foundations strengthened. The station is at an elevation of 1,800 feet greater than that of Dawson. Nevertheless the season is several weeks in advance of this locality. The second dredge on 90 will be ready early in June; the Arlington dredge not until July. Those at the Hillside and at 37 below will be even later.

If Black Hill Creek shows up well this summer as a gold producer a change in the route of the overland route to Whitehorse will result.

MINING NEWS OF THE WORLD.

GERMANY.

Dr. Hermann Wedding, professor of metallurgy at the Berlin School of Mines, is dead. He was the author of numerous treatises on metallurgy and an honorary member and Bessemer gold medallist of the British Iron and Steel Institute.

RUSSIA.

The iron ore production of Russia for 1907 was larger than in any previous year. Exchanging the manganese ore exported from Poti, it amounted to 262,100,000 poods, as compared with 236,400,000 poods in 1906. The amount exported was 605,000 poods in 1907, as against 33,300,000 poods the previous year.

The proposed trust of the Southern Metallurgical Works, preliminary arrangements for which have been effected, embraces mine companies which among them control 88.84 per cent. of the southern and 45.04 per cent. of the total Russian metallurgical output.

SWEDEN.

Gold has recently been discovered in the reefs and sands of the Topdal and Toovisdal rivers near Christianssand. Prospecting over a large area has established the fact that the gold bearing sands extend over a considerable tract of country.

UNITED STATES.

The American Petroleum Company of Los Angeles, Cal., has bought 1,200 acres of oil land in Coalinga district, Fresno County, Cal., for $2,000,000.

Work has been resumed on the Neversweat and West Gray rock copper mines, Butte, Montana, which leaves only one big

mine in the district still closed. A large amount of exploration work is being done. The amalgamated properties have greatly reduced the cost of copper production, which is believed not to exceed 10 cents per pound throughout the district.

Numerous rich strikes of gold are reported in Nevada County, Cal., the most important being in the Idaho-Maryland, one of the oldest quartz mines in Grass Valley, where a phenomenally rich ore body has been found on the 500 foot level.

Ground has been broken at Coaldale, Penn., for the erection of the largest breaker in that district by the Lehigh Coal & Navigation Company. It will have a daily output of 4,000 tons.

GREAT BRITAIN.

Returns received by the British Iron Trade Association give the production of Bessemer steel ingots for 1907 as 1,859,259 tons as against 1,907,338 tons in 1906. Of last year's output 1,280,315 tons were made by the acid process, and 578,944 tons by the basic process. The production of Bessemer steel rails in 1907 was 532,576 tons, as compared with 854,740 in the previous year.

The United Collieries, Limited, of Glasgow, have closed down six pits in Lanarkshire, owing to the low price of coal, throwing 900 men out of work.

The Dowlais-Cardiff Company, of Abercynon, Wales, recently established a record by raising 2,747 tons of coal during the day shift from a depth of 700 feet.

MEXICO.

Between 30 and 40 British mining companies are operating in Mexico with a capital of upwards of £7,000,000. France has £1,200,000 invested in similar enterprises, while the American capital employed in Mexican mining amounts to £25,000,000.

Construction work on the E. H. Harriman smelter at Mazatlan will shortly be started on a contract requiring the smelter to be completed by June of next year. The amount of capital to be invested is about $3,000,000. The smelter will afford a market for many mining sections in the west of Mexico.

The Barrateros mine near Cosala, in Sinaloa, which is one of the oldest in Mexico, having been worked by the Spainiards 360 years ago, has been secured by Mr. George F. Beveridge, of Los Angeles, Cal.

The extent to which American mining machinery has been introduced into Mexico is indicated by the fact that at the Pinguico mine, Guanajuato, no fewer than 250 Westinghouse electric motors are in operation.

COMPANY NOTES.

THE CONSOLIDATED MINING & SMELTING COMPANY.

The fiscal year of Consolidated ends on the last day of this month, and the gross value of its output will be in advance of the previous year. The first nine months' output exceeded the total yield for the entire previous fiscal year by about one hundred thousand dollars.

The production of the company for the quarter ending September 30, 1907, the half year ending December 31, and the nine months' period ending March 31, 1908, shows as follows in detail:—

Quarter ending September 30, 1907:

Metal produced.	Quantity.	G. value.	P.C.
Gold, ozs..	25,120	$514,960	38.85
Silver, oz..	522,719	287,925	21.73
Copper, lbs..	1,201,426	209,365	15.79
Lead, lbs....	7,205,567	313,142	23.63
Total		$1,325,392	100.00

Six months ending December 31, 1907:

Gold, ozs..	54,840	$1,124,219	39.40
Silver, ozs..	1,271,087	771,500	27.10
Copper, lbs..	2,348,359	353,308	12.40
Lead, lbs..	15,482,797	599,772	21.10
Total		$2,848,799	100.00

Nine months ending March 31, 1908:

Gold, ozs.....	90,306	$1,851,272	44.30
Silver, ozs..	1,761,431	1,042,847	24.95
Copper, lbs..	3,137,749	457,608	10.25
Lead, lbs..	22,807,389	827,059	19.80
Total		$4,178,786	100.00

The most interesting feature in these figures is the gradual rise in the percentage in value of gold produced to 44.30 per cent., which is accounted for by the larger and richer ore bodies being encountered in the low levels of the War Eagle and Centre Star. This increase in production of gold should be a most potent factor in adding steadiness to the earning power of the company.

At the annual meeting of the Silver Leaf Mining Company, held June 2nd, a statement was submitted showing that the organization and operating expenses for the year ended April 30th were $59,040.95, while the net profits for the period were $76,933.79.

The electors elected were: A. G. Browning, North Bay; Jno. L. Coffee, S. Cft Smoke, D. M. Robertson, C. W. Irwin, J. B. Chapin, Toronto; George L. Walker, Boston; J. L. Stanton, New York, and H. D. Symmons, Niagara Falls.

At a subsequent meeting of directors the following officers were elected for ensuing year: A. G. Browning, president; J. B. Chapin, vice-president; O. E. Osler, Thomas D. F. Maguire, secretary.

ABSTRACT OF FOSTER CIRCULAR.

Mr. John G. Kent, president of the Foster Cobalt Mining Company, has issued the following circular to shareholders:

It is just one year ago that the present board of the company assumed office, and one the 28th day of June, 1907, they called a special meeting of the shareholders to consider the condition of the property and to authorize certain development work, and also to authorize the sale of the treasury stock of the company. At that time the company showed an indebtedness, approximately, of $30,000, with 100,000 shares of stock in the treasury. There was also presented to the shareholders a statement of the physical condition of the property, prepared after inspection by Mr. Frank C. Loring, mining engineer.

During the past twelve months the property has been developed along the lines indicated in Mr. Loring's report, with the result that not only has this development been provided for, necessary buildings erected and appliances purchased, but there remains a substantial cash surplus sufficiently large to continue aggressive development for at least another twelve months.

In common with all mining experiences, the year's work has not been without the usual disappointments. Some ore bodies running high in silver, months ago, have not maintained their high silver value with the continuity which was hoped for, but, as will be seen by extracts from Mr. Loring's present report, there is every reason to expect a recurrence of high values at present and lower levels.

The treasury stock remaining on hand, unsold, is 84,412 shares.

Feeling assured that the shareholders of the company would be glad of information at this time, your directors again commissioned Mr. Loring to make a report of the property, and the following are extracts from this report:

"Vein No. 5—Between levels 1 and 2 there are probably 600 tons of ore, carrying more than ten per cent. cobalt per ton. So far as development shows, this ore is low in silver, not more than 40 ounces. Possibly, however, at any point between these two levels, rich silver ore may be encountered.

"On vein No. 8, an underhand stope is being mined from first level downward. From this stope the same rich ore which was mined above this level is being taken out. As to the depth this rich ore will continue, it is impossible to say.

"On vein No. 1, second level, should the copper sulphide ore there exposed continue to any great extent, it could be profitably mined for the copper contained, and the silver contained therein.

"On vein No. 1, at surface near lake, ore may continue down for some distance, and several carloads may be extracted therefrom. It is, however, impossible to predict what quantity of high grade ore can be expected.

"Therefore, so far as ore that can at present be marketed profitably is concerned, ore reserves consist of:

"Ore high in cobalt, low in silver, on vein No. 5 between levels 1 and 2;

"Ore high in cobalt, low in silver, on vein No. 8 above second level;

"Ore rich in silver, having a present length of about 30 feet below first level, vein No. 8;

"On vein No. 1, at surface, ore extending southeasterly from lake for a distance of about 80 feet, and probably extending into lake. The depth and extent of this ore body is unknown, but may yield a considerable quantity of high grade ore.

"All development work, timbering and buildings, have been done and constructed in a substantial and miner-like manner, giving evidence of skill and intelligence in operation, and for the best interest of the shareholders.

"Development work, especially on veins Nos. 1, 5 and 8, gives additional proof that these veins are strong and will continue to great depth, and there is more reason than there has ever been before for continuing development to far greater depth, with a strong probability that ore bodies high in silver will be encountered at some point. I, therefore, recommend vigorous and extensive additional exploration in depth, especially on veins 1, 5 and 8.

"It should be borne in mind, however, that this work is necessarily expensive, consequently ample provision should be made by maintaining large cash reserves, that any possible contingency or delay in the encountering of rich ore bodies may be provided for.

"(Sgd.) FRANK C. LORING,
"Mining Engineer."

"Toronto, Ont., May 29, 1908."

Your directors feel that they have every reason to proceed with the development of the property along the well-defined lines already followed, and while still refraining from making definite predictions as to the values to be recovered, they have every reason to feel the greatest encouragement from results already obtained, and that the prospects are very favorable.

Reports which are absolutely untrue have been circulated in some quarters regarding the mine. Your directors cannot meet such incorrect statements every time they are made, nor can directors of any mine be expected to reply to all the misleading paragraphs which appear from time to time regarding most of the Cobalt properties.

The facts concerning "Foster" are given above, and it is hoped that the shareholders will feel, as the fact is, that the above report is not only true, but conservative in every respect.

Shareholders are invited to inspect maps and details of workings on file at the head office of the company.

The directors of the Dominion Coal Company met in Montreal on May 27th and declared the regular quarterly dividend of 1 per cent. on the common stock, payable July 1st.

On June 2nd the directors of the Granby Consolidated Company decided to resume dividends, and declared 2 per cent., payable June 30, to stockholders of record of June 12.

The Granby Company during 1906 paid quarterly dividends of 2 per cent. and 1 per cent. extra in January, May, September and December, and in 1907 in March, June and September.

Dividends stopped then, for the bottom dropped out of the copper market. This is the way Granby stock fluctuated during 1907:

	High.	Low.
January	140	130
February	151	130
March	146	120
April	136	125
May	139	125¼
June	125½	117½
July	127¼	121
August	115	99
September	100	80
October	92	60
November	90	70
December	80	70

The directors did not make a statement, but it is presumed that the stock is now on an 8 per cent. basis.

STATISTICS AND RETURNS.

The Transvaal gold output in May, as estimated by Kaffir houses in London, was 580,00 ounces, fine. The April output was 565,832 fine ounces; that of May last year 524,477.

If it proves correct, says The Post, this May estimate of the Rand will match all records. The total of last December was 583,526 ounces, but included a large amount "taken from reserves." Value of the May output calculated on the basis of the above estimate, compares as follows:—May, 1908, $12,325,000; April, 1908, $11,924,000; March, 1908, $12,210,000; February, 1908, $11,510,000; January, 1908, $11,900,000; December, 1907, $12,393,000; May, 1907, $11,139,000; May, 1906, $9,795,000; May, 1905, $8,843,000; May, 1904, $6,679,000; May, 1903, $4,973,000; May, 1902, $2,943,000.

Shipments from the collieries of the Cumberland Railway & Coal Company for the month of May were 24,710 tons.

For the month of May the output of coal from the four collieries of the Nova Scotia Steel & Coal Company was about the same as the preceding month. The output from No. 4 is gradually increasing, having almost doubled the output of April. Following are the figures from the different collieries:

	Tons.
No. 1	21,298
No. 2	23,784
No. 4	1,116
No. 5	7,390
Total	53,588

The output of pig iron at the blast furnaces was the largest since the company's existence, 6,064 tons.

May was a busy month at the Dominion Steel Works, and the output exceeded the big figures of Apral. The May output was as follows:

Pig iron	21,864
Ingots	5,650
Blooms	20,045
Rails	12,316
Rods	3,765

Dominion Coal's May output was 332,588 tons, against 327,269 tons last year.

This makes the company's output 242,899 tons ahead of a year ago for the five months:

	1908 Tons.	1907 Tons.
January	314,108	252,248
February	285,649	225,988
March	346,529	212,831
April	298,745	316,384
May	332,588	327,269
Total	$1,577,619	$1,334,720

Following are the weekly shipments from Cobalt camp, and those from Jan. 1 to date:

	Week end May 30.	Since Jan. 1
Coniagas	62,030	505,580
Drummond	56,260	148,600
La Rose	60,000	2,181,652
McKinley	66,540	1,373,560
Nipissing	184,220	1,548,110
O'Brien	254,810	2,357,130
Silver Queen	110,310	634,510
Trethewey	124,850	997,456

The total shipments for the week were 919,020 pounds, or 459 tons.

Cobalt ore shipments for the week ending May 25th totalled 905,780 pounds, or 452 tons.

The total shipments for the year to date are 13,210,228 pounds, or 6,605 tons. The shipments by mine follow in pounds:

	Week ended May 25	From Jan. 1
Buffalo	451,000	510,810
Coniagas	62,640	444,550
La Rose	140,000	2,121,652
McKinley	63,120	1,307,020
O'Brien	275,450	1,106,220
Right of Way	61,060	242,240
Silver Leaf	63,820	196,620
Trethewey	192,690	872,606

Following are the weekly shipments from Cobalt camp, and those from Jan. 1 to date:

	Week end June 6	Since Jan. 1
Buffalo	42,900	653,710
Coniagas	.....	505,580
Cobalt Lake	.....	246,455
Crown Reserve	44,000	84,000
Cobalt Central	.....	56,380
City of Cobalt	113,510	452,110
Drummond	.....	148,000
Foster	.....	238,400
Kerr Lake	101,650	404,320
King Edward	.....	127,240
La Rose	120,000	2,301,652
McKinley	.....	1,373,560
Nipissing	.....	1,746,120
Nova Scotia	.....	227,555
Nancy Helen	.....	140,420
O'Brien	183,840	2,540,970
Right of Way	.....	242,240
Provincial	.....	143,210
Standard	.....	39,730
Silver Leaf	.....	196,620
Silver Cliff	.....	52,000
Silver Queen	.....	634,510
Townsite	.....	85,100
Temiskaming & H. B.	.....	599,000
Temiskaming	.....	325,390
Trethewey	.....	997,456
Watts	65,590	246,020

The total shipments for the week were 866,500 pounds, or 433 tons. The total shipments from Jan. 1 to date are 14,995,748 pounds, or 7497 tons.

The folowing are the shipments from the various mines in the districts of Southeastern British Columbia and the receipts at smelters for the past week, ending May 23rd and year to date:

Ore Shipments:

Mine.	Week.	Year.
Boundary—		
Granby	20,766	522,760
Mother Lode	2,000	2,000
Oro Denoro	480	480
Crescent	30	58
Other mines	...	434
Total	23,276	425,732
Rossland		
Centre Star	2,647	68,380
Le Roi	1,580	31,538
Le Roi No. 2	316	12,320
Other mines	...	500
Slocan Kootenay—		
Whitewater (milled)	280	5,740
Poorman (milled)	250	4,380
Queen (milled)	185	3,690
Second Relief (milled)	145	2,100
St. Eugene	81	8,720
Richmond	76	681
Rambler-Cariboo	42	587
Vancouver	20	521
Other mines	...	15,077
Total	1,079	41,496

Smelter Receipts—		
Granby	20,766	422,720
Greenwood	2,480	2,480
Trail	4,088	109,205
Northport (Le Roi)	1,740	33,693
Marysville	....	5,730
Total	29,074	573,828

The following are the ore shipments for the past week, ending May 30th, and year to date, from the mines of Southeastern British Columbia, and the receipts at the smelters of the district:

Ore shipments:

Boundary—	Week.	Year.
Granby	21,489	444,470
Mother Lode	3,510	5,510
Oro Denoro	1,450	1,930
Other mines	.....	522
Total	26,449	452,432
Rossland—		
Centre Star	2,956	71,336
Le Roi	1,500	33,038
Grant	18	18
Other mines	.....	12,822
Total	4,474	117,214
Slocan-Kootenay—		
St. Eugene	212	8,942
Whitewater (milled)	280	6,020
Poorman (milled)	250	4,600
Second Relief (milled)	145	2,245
Queen (milled)	185	3,875
Fern (milled)	200	200
Richmond	48	729
Silver Cup	39	239
Hewitt	22	199
True Fissure	53	125
Ymir	21	125
Other mines	...	15,755
Total	1,455	42,931
Grand Total	32,378	612,575
Smelter Receipts:		
Granby	21,489	444,470
Greenwood	4,960	7,440
Trail	4,283	113,488
Northport (Le Roi)	1,650	35,343
Marysville	.....	5,730
Total	32,382	606,471

Rossland, B.C., June 6.—Following are the shipments from the Rossland mines for the week ending this evening:—Centre Star, 3,860 tons; Le Roi, 1,610 tons; Le Roi No. 2, 385 tons. Total for the week, 5,855 tons, and for the year, 126,892 tons.

The output of the Crow's Nest Pass collieries for the week ending June 5th was 20,899 tons, or a daily average of 3,483 tons. Same week last year, 21,696 tons; daily average, 3,616 tons. Same week, 1906, 20,523 tons.

month of April amounted to 19,948 tons, being a decrease of 598 tons, as compared with the corresponding month last year; while the total output, from July 1 last, amounts to 225,000 tons, an increase of 12,528 tons.

The output of coal from the Crow's Nest Pass collieries for the week ending May 29th was 10,212 tons; daily average, 1,702 tons; same week, 1907, 21,504 tons; daily average, 3,584 tons; same week, 1906, 20,835 tons.

MARKET REPORTS.

Coke.

June 5—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt, $1.5 to $1.60.
Foundry coke, prompt, $2.00 to $2.25.

Pig Iron.

June 5—Pittsburg—
No. 2 foundry, $15.40 to $15.90.
Bessemer, $16.90 to $17.15.
Basic, $16.15 to $16.40.
Malleable, $15.90 to $16.40.
Southern No. 2, $15.15 to $15.40.

Other Metals.

June 5—
Tin, Straits, 28.35 cents.
Copper, prime lake, 12.87½ to 13 cents.
Lake arsenical brands, 12.85 cents.
Electrolytic copper, 12.85 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.40 cents.
Spelter, 4.67½ cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.70 cents.
Aluminium, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $22.50 to $25 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $45 per 75 pound flask.

Silver Prices.

	New York. Cents.	London. Pence.
May 25	53 1/4	24 9-16
May 26	53 5/8	24 11-16
May 27	53	24 7-16
May 28	52 7/8	24 3/8
May 29	53	24 7-16
May 30		24 7-16
June 1	53	24 7-16
June 2	52 3/4	24 1/4
June 3	52 3/4	24 5-16
June 4	52 5/8	24 1/4
June 5	52 7/8	24 3/8
June 6	52 7/8	24 3/8

MARKET NOTES.

A cut of $4 a ton in bar steel went into effect on June 3rd in Cleveland. The new price goes into effect at once, but will effect only manufacturers' stock. The cut is based upon the Pittsburg rate of $1.60 per hundred pounds. The new price is $1.40 per hundred. This reduction will probably induce a better coke trade.

A considerable quantity of lead is held in stock. It is therefore hard to judge the actual position of the metal. It is doubtful if the price would hold if the reserves were placed on the market.

The small stocks of copper in the hands of manufacturers should result in higher prices in the near future. Demand is still lower than normal.

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In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

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The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

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Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

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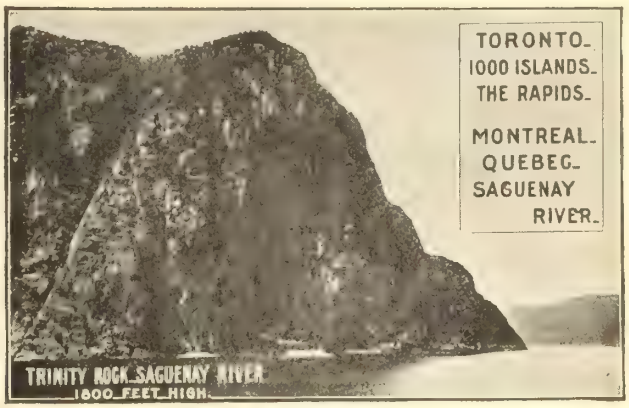
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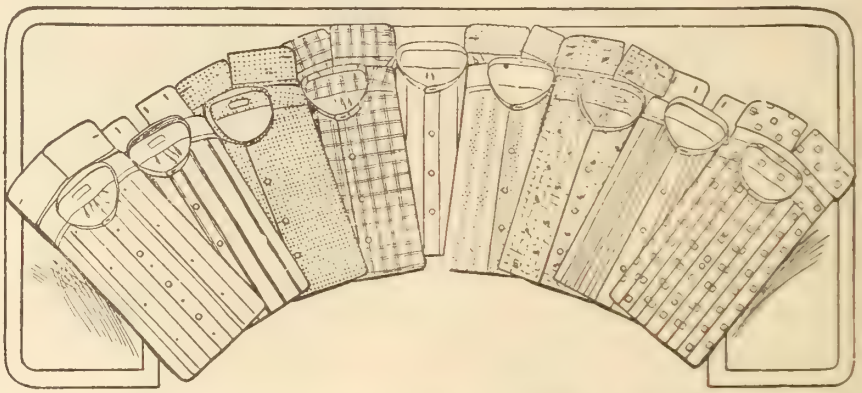
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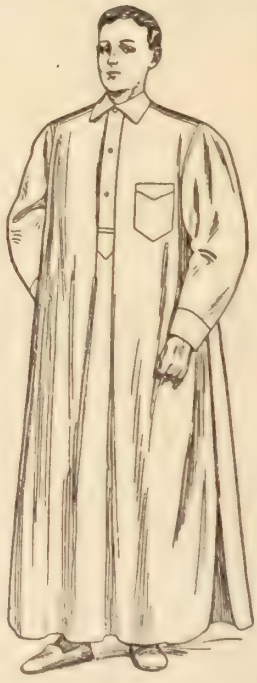
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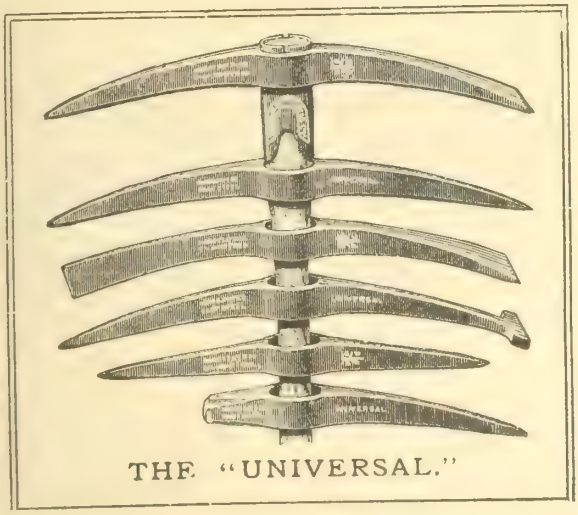
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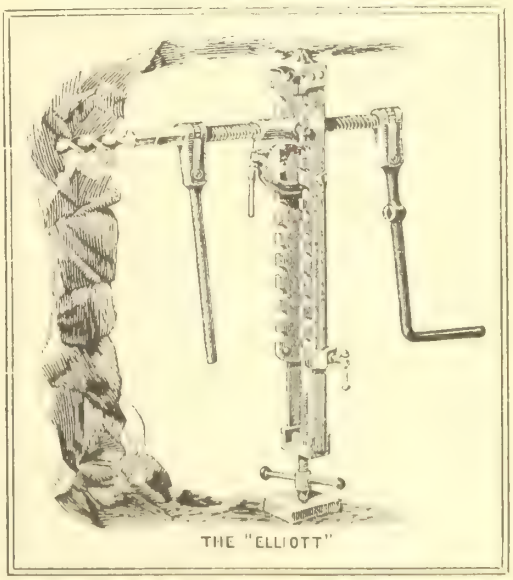
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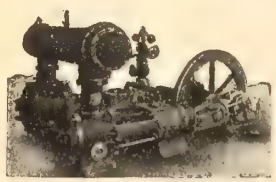
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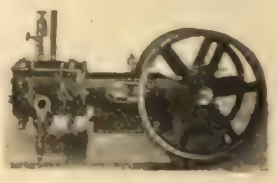
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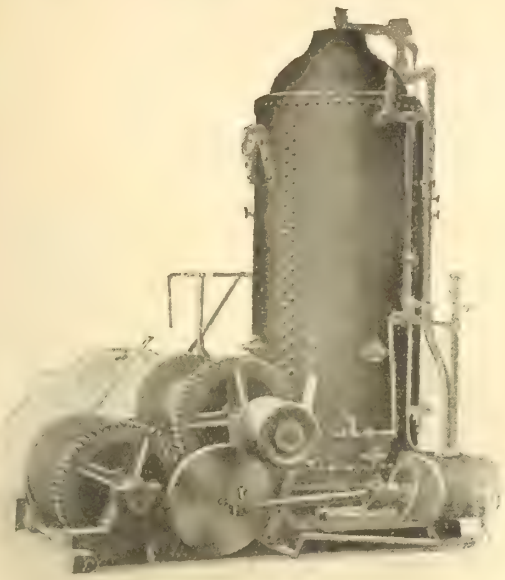
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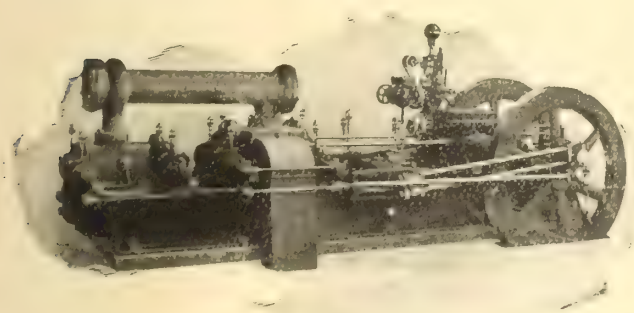
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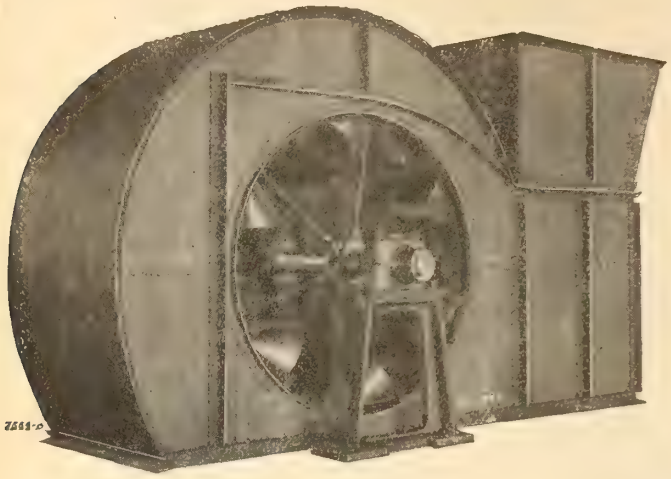
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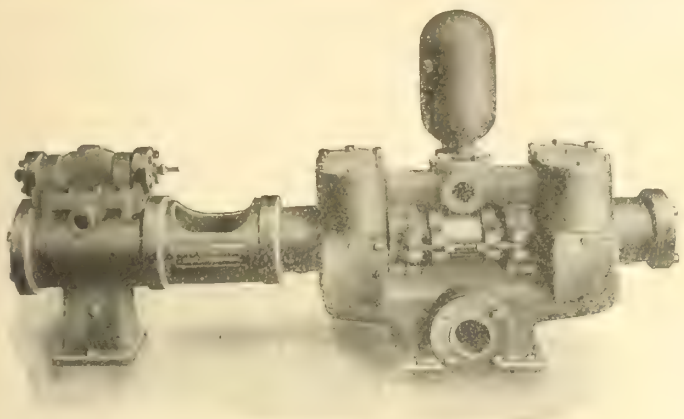
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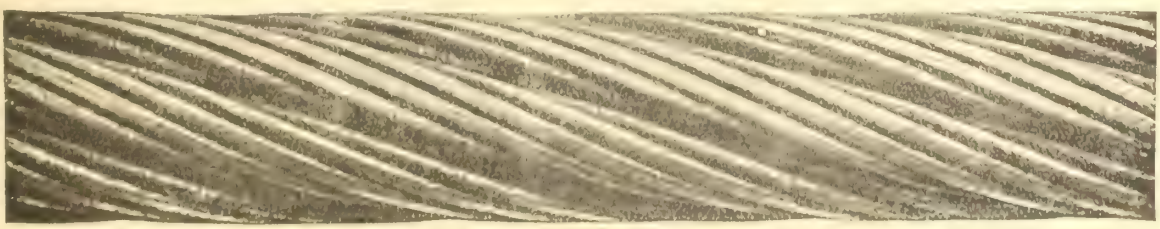


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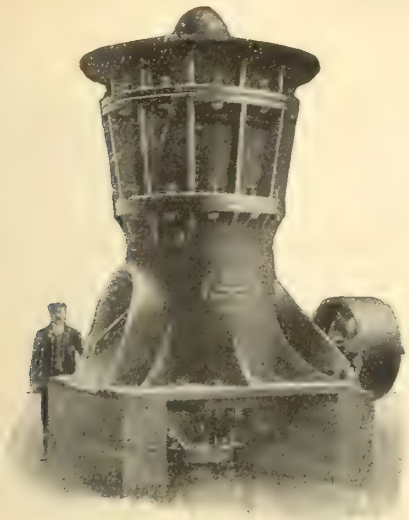
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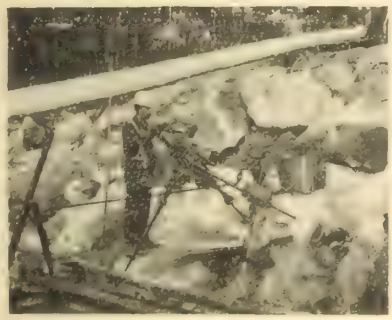
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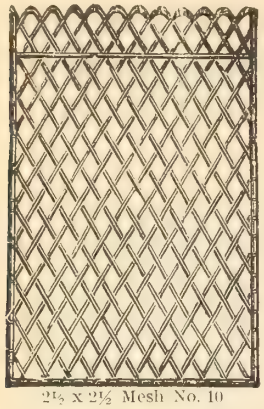
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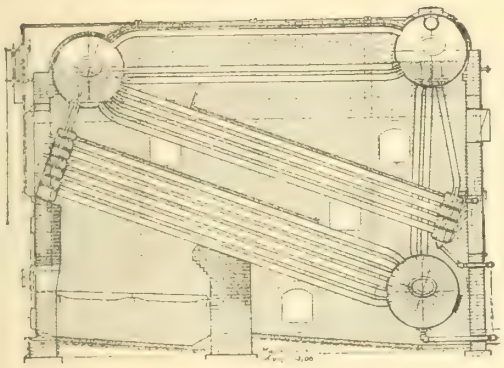
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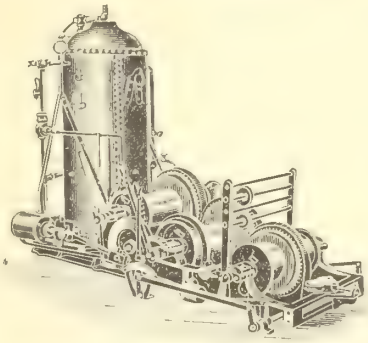
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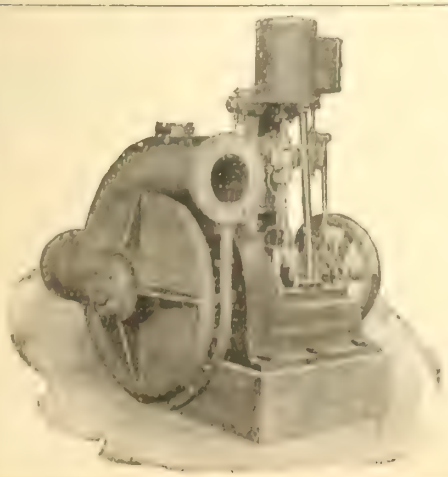
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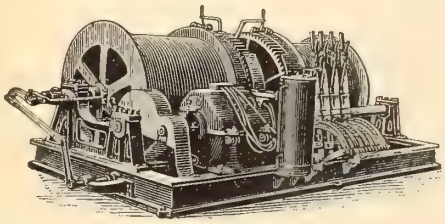
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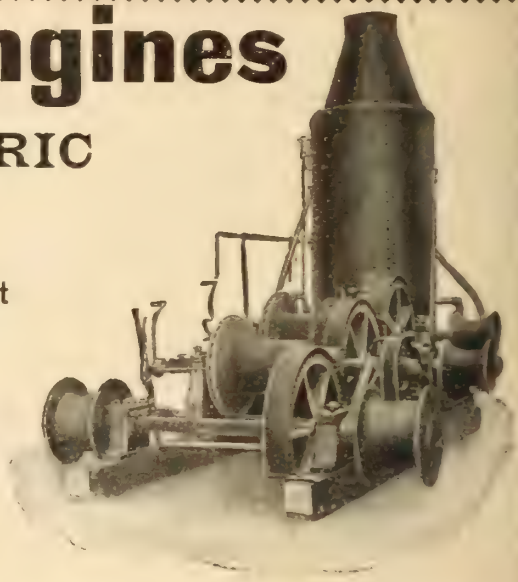
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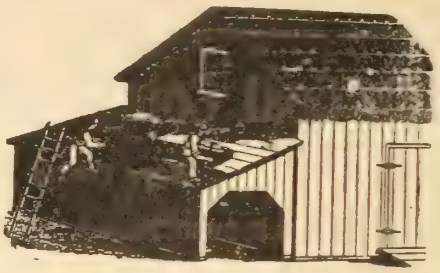
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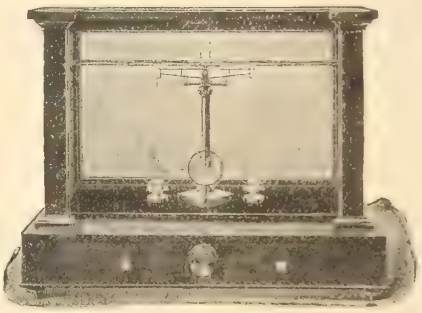
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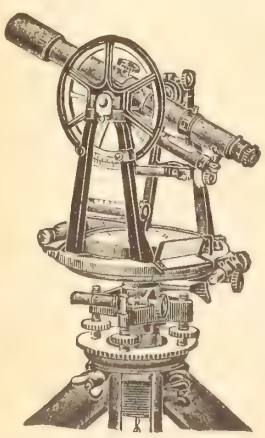
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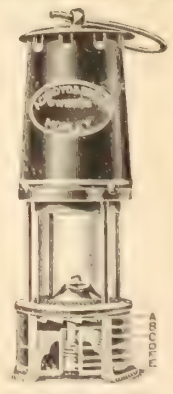
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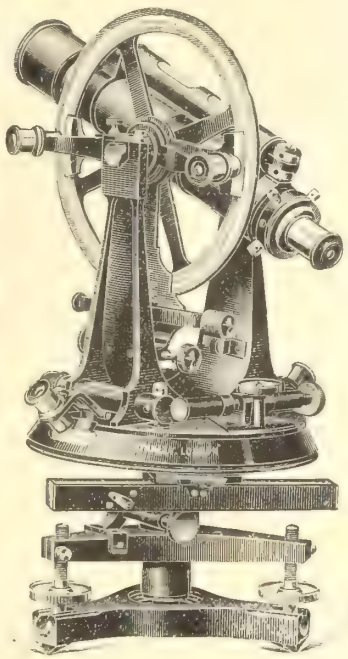
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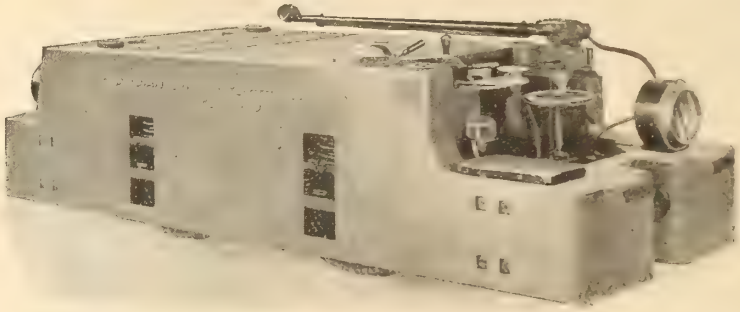
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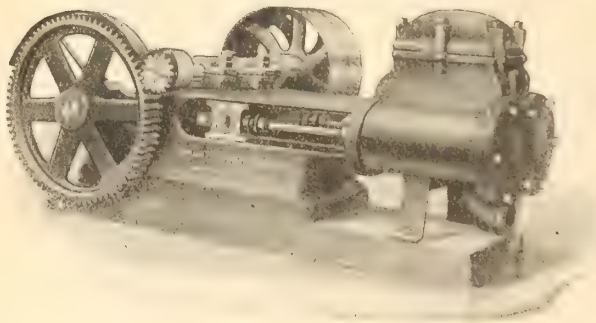
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THE CANADIAN MINING JOURNAL

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GLASS HOUSES.

An effort is being made in Mexico to push through legislation that will exclude foreigners from acquiring or retaining the ownership of Mexican mining properties. Our United States contemporaries are protesting vigorously against this drastic and short-sighted proposal. It is believed that President Diaz will not, under any circumstances, consent to the passage of such an unjust enactment.

The moment is opportune for the fervid Republic to our immediate south to do some soul-searching. Is it not so that in some of the States aliens are unable to locate or to acquire mining claims? Or, better, how does Mexico's treatment of the United States investor compare with the treatment accorded foreign investors in mining property in the United States? Is it possible that Mexico is not the only country that has considered enactments inimical to the interests of the stranger within her gate?

"On the question as to whether an alien can make a valid location," says a recognized United States authority, "there has been some conflict among the cases . . . An alien by making a location obtains rights in which he will be protected by the courts against all the world except the Government, which, as the owner of the land, has the sole right to dispute his possession . . . But this is true only so long as the alien allows his rights to rest in location; for he cannot obtain a patent because his citizenship, or declaration of intention to become such, must affirmatively appear before patent be granted . . . Some of the mining States have statutory provisions that the location certificate that is recorded must contain a sworn statement that the locator is a citizen or has declared his intention to become such."

In the light of these facts the situation is not devoid of humor.

CHAMBERS-FERLAND.

La Rose Consolidated was the subject of editorial comment in the last number of "The Canadian Mining Journal." The announcement of the Chambers-Ferland flotation is equally deserving of remark.

The Chambers Ferland property comprises 121 acres situated advantageously, even strikingly. Part of the property surrounds La Rose. South, east and west the O'Brien and Nipissing are immediate neighbors. Other facts lead to the conclusion that, to say the most, Chambers-Ferland is a property of high promise.

However, none but the most superficial development has been performed. Thus, to a considerable degree,

Chambers-Ferland's value is speculative. Incidentally the owners of this property exhibit the same curious, unmodern self-abnegation. They prefer not to work for their own gain a property that they assert will return enormous dividends. Quite seriously, it is hardly in keeping with previous experiences and fixed beliefs to encounter altruism of this high type. The property could have been leased long ago to operators as other Cobalt mines have been. It would now have been a proved property.

Apart from this element of mystery we see no reason why Chambers-Ferland, even with the drag of a 25 per cent. royalty, should not become a successful mine.

In estimating the possibilities of the enterprise, there are several factors that must not be overlooked. The share capital is $2,500,000. An adequate net profit for a year's operations would hardly be less than $500,000, of which $125,000 would go to the Provincial coffers as royalty. Building and equipment, especially if a concentrating mill is to be erected, prospecting, and surface work, will unquestionably draw largely upon the earnings of the first year or, rather, two years of operation. If the mine yields 15 per cent. per annum to shareholders it will not be doing more than should be expected. With a life of ten years this rate of regular dividend payment would be by no means other than modest. If, however, the shares (which, we are informed, will be offered to the public at 75 cents) are forced beyond parity (one dollar), there is no present foundation for considering them of exceptional value.

At this stage of the game opinions are merely—opinions. Whatever facts have been definitely ascertained should be looked at in all their bearings. The lack of development, the impossibility of making immediate heavy shipments, our ignorance as to how much of the Ferland-Chambers ore will prove high grade and how much will have to be concentrated, the absence of positive ore reserves, are considerations that should be weighed against the favorable aspects of the proposition.

Also there is a sharp distinction as between the *opinion* of a mining engineer as to the possibilities of an unprospected property, and the careful, accurate report upon the actual present physical condition of that property by the same man.

Opinions are merely expressions of personal belief. In a mining engineer's report they are of secondary importance. On the other hand, a report is essentially a record of facts and conditions from a man trained to observe and to correlate accurately. Hence, until reasons based upon observed facts are adduced in support of opinions, the opinion of a mining engineer, whether it be laudatory or damnatory, must be taken as having precisely the same amount of the speculative in it as there is in the mine itself.

We do not question the sincerity of expert opinions quoted or to be quoted. The fact remains, however, that there is much yet to be learned about Chambers-Ferland. And the only path to knowledge is vigorous and economical prospecting.

It may also be added that $2,500,000 is not a low capitalization for an undeveloped mining property.

MINING ENGINEERS IN POLITICS.

Canadian parliamentarians are drawn largely from the ranks of practising lawyers, prominent merchants, doctors, journalists, a sprinkling of farmers and labor representatives, and a miscellaneous residue, including an occasional preacher.

The profession of mining engineering has no direct representative. The industry of mining is attaining an importance that warrants the presence of at least a few mining engineers in our parliaments. Much-needed legislation would then receive fuller and saner discussion than is now possible.

The mining engineer, from the extent of his field and the nature of his work, acquires a knowledge of his country that can hadly be equalled. He would bring to his legislative duties all the qualities of good citizenship with the added special equipment necessary to the practice of an exacting profession.

SCRIBES AND SCRIBBLING.

For the edification of the down-trodden coal miner there are scribes a-plenty. The uplifting screeds of one or two of these excellent persons are the text on which our Nova Scotian correspondent hangs a forceful sermon.

An English writer, quoted in a Canadian newspaper, puts forward the extraordinary statement that from figures quoted "it will be clear that the miners wages are an almost negligible item in the cost of coal." Developing his theme he boldly asserts that if the "swollen profits" of parasites could be excised, coal could be sold at a much lower price.

A complete answer to this argument lies in the fact that in ordinary coal mining operations wages constitute from 70 per cent. to 80 per cent. of the working expenses.

We see little good and much harm in giving a hearing to agitators or others who are so scantily informed on the subjects of which they write. As our correspondent points out, the persistent clamour for class legislation in favor of coal miners is based upon a fundamental error. There is no essential merit in earning one's living by physical labor. Neither is there essential blame or shame. But there is blindness and foolishness in claiming that only the workingman who toils with his hands is deserving of special privileges.

SUDBURY AND TORONTO.

The new Canadian Pacific direct line from Toronto to Sudbury reduces the time of that journey by eight hours. Sudbury is thus brought substantially closer to the metropolis of Ontario. The handling of freight from and to an important mining and railway centre is the keynote of development. The new line will increase materially both freight and passenger traffic facilities.

We do not doubt that an impetus will be given to the opening up of the known copper deposits of the Sudbury region. Present freight rates are by no means at an irreducible minimum. In operation the direct route may reduce competitive reduction of tariffs.

Incidentally Sudbury will acquire added importance as a shipping and distributing point.

A NEW MARKET FOR BRITISH COLUMBIA COAL.

The establishment of a large coaling station on the Pacific coast of Mexico is announced. Manganillo harbor has been chosen as the site. If all goes well it is expected that the improved facilities to be provided at this port will encourage the exportation of British Columbia coal from the coast collieries.

It may be justly remarked that one of the first needs of Vancouver and Victoria and the coast generally is cheaper coal. The prices at which the fuel is sold in these cities are unnecessarily high.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

The Mines of the Glace Bay Basin.

(Article II. by F. W. Gray.)

The Glace Bay Basin has been much more extensively worked than any other portion of the Sydney coalfield, although as may be seen from an examination of the following comparative chart of outputs, it was the last of the basins to be systematically opened up. As will be seen from the chart the output curves of the four basins ran almost together during the first two decades of coal mining in Cape Breton, and it was not until the early 'eighties'' that the production of the Glace Bay Basin began to sensibly exceed that of the other sections of the Sydney coalfield.

From 1880 to 1893 the outputs increased steadily. In 1893 the Dominion Coal Company commenced operations, and from that time on the outputs have increased by leaps and bounds.

The following table gives the outputs of each basin of the Sidney coalfield from 1893 to 1907, arranged in two periods of twenty-five years, showing how remarkable has been the development of the coal mining industry during the quarter of a century just passed compared with that which immediately preceded it.

	Production from 1858 to 1882.	Production from 1883 to 1907.
Sydney Mines Basin	2,636,000	6,963,000
Lingan Victoria Basin	842,000	1,175,000
Morien Basin	1,779,000	1,850,000
Glace Bay	2,596,000	35,900,000
	7,853,000	45,888,000

During the fifteen years that have elapsed since the formation of the Dominion Coal Company, they have produced from their mines, in the Glace Bay Basin only, a little over 32,000,000 tons of coal, to which the various seams have contributed in approximately the following proportions:

		Per cent.
Gardiner seam	30,000	..
Emery seam	260,000	1
Hub seam	800,000	2½
Harbour seam	4,510,000	14
Phalen seam	26,400,000	82½
Total	32,000,000	100

The basin, or to use a more exact simile, the "saucer like" formation of this field is very marked, and the crops of the coal seams have been bared by the scour of the ice-age, so that, owing to the even flatness of the surface, and the regular pitch and consistent parallelism of the coal seams, they appear on the map in strikingly symmetrical concentric form.

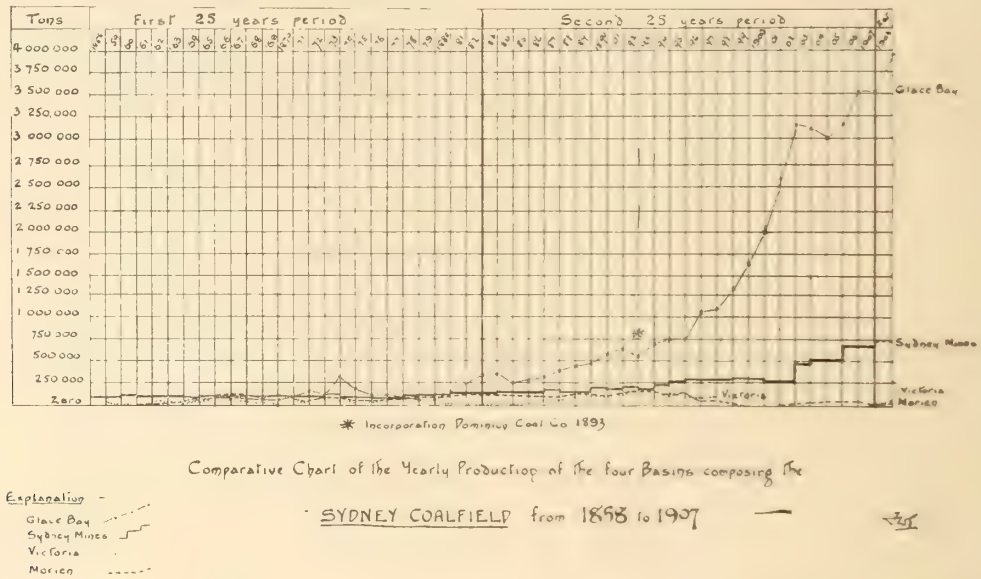
There is a complete absence of faulting or dislocation of the strata in this field, although there are occasional undulations or "swillies," and local changes in the thickness of the seams, such as are to be met with in all coal deposits.

In the earlier days of coal mining in the Glace Bay district the seams apear to have been attacked from the outcrops in a happy-go-lucky and haphazard manner, without much regard for the future. No barriers, or very inadequate ones, were left along the crops to protect the lower and later workings, while the pillars left in the first operation were too small, the consequence being that much coal has been lost by creeps and crushes in addition to which the surface water has found its way through the many openings in the outcrops, leaving a legacy of pumping cost to the present generation. The measures in this district are "short" and brittle, and where the cover is light they will

break up today after the excavation of the underlying coal seams, thus admitting the surface drainage.

The land area of the Glace Bay field would have been a positively ideal one for easy and cheap working had it been mined to the rise from properly located shafts. Had this been done, haulage and pumping problems would have been simplified exceedingly, but instead most of the coal has been hauled from the deep.

The genesis of this short-sighted and expensive procedure is to be found in the fact that the coal field was



of the operator, the revenue of the Provincial Government, or the price of coal to the consumer. This statement is based on considerations of an engineering character only. Equally cogent and weighty commercial factors could be adduced in support of this statement, but such considerations are outside the scope of this description. When it is borne in mind that in 15 years the Dominion Coal Company produced more coal by 50 per cent. than was produced in the 35 years that that preceded their incorporation, it will be recog-

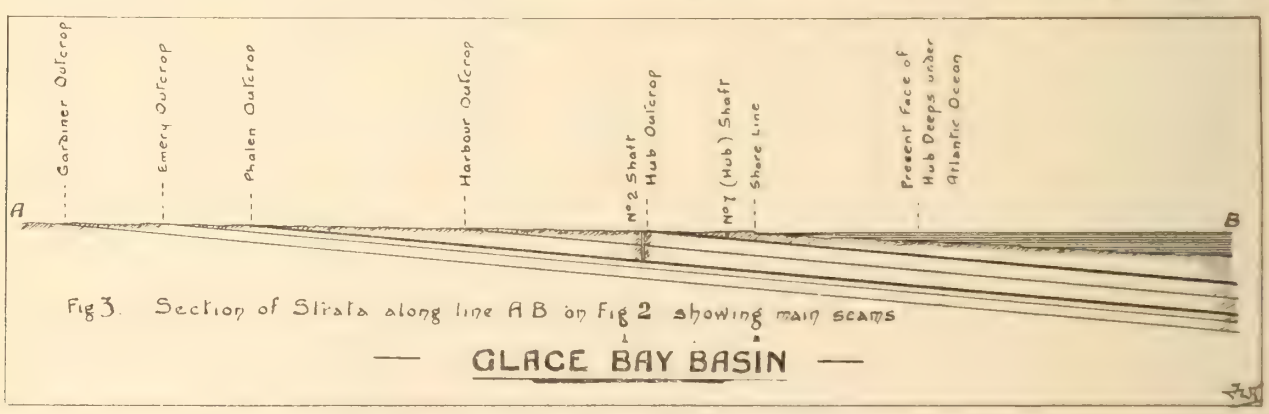
operated by independent and rival companies, with inadequate capital, who, to quote from a report made by H. Y. Hind in 1871, "allowed the desire for an immediate profit to supersede the necessity of a judicious arrangement of the mode of working."

It was therefore, very decidedly for the benefit of all concerned in the mining of coal in this district that a consolidation of interests should take place. This occurred when the Dominion Coal Company was formed, and there can be no doubt that had the Glace Bay Basin been worked as a virgin field by this or a similar corporation the result would have been a marked conservation of our national coal resources, and, incidentally, cheaper coal at the present time.

One could hardly conceive from an engineering or economic standpoint a series of mines where an amalgamation of interests was more desirable, or where independent operation was more likely to have disastrous future consequences, alike as regards the profits

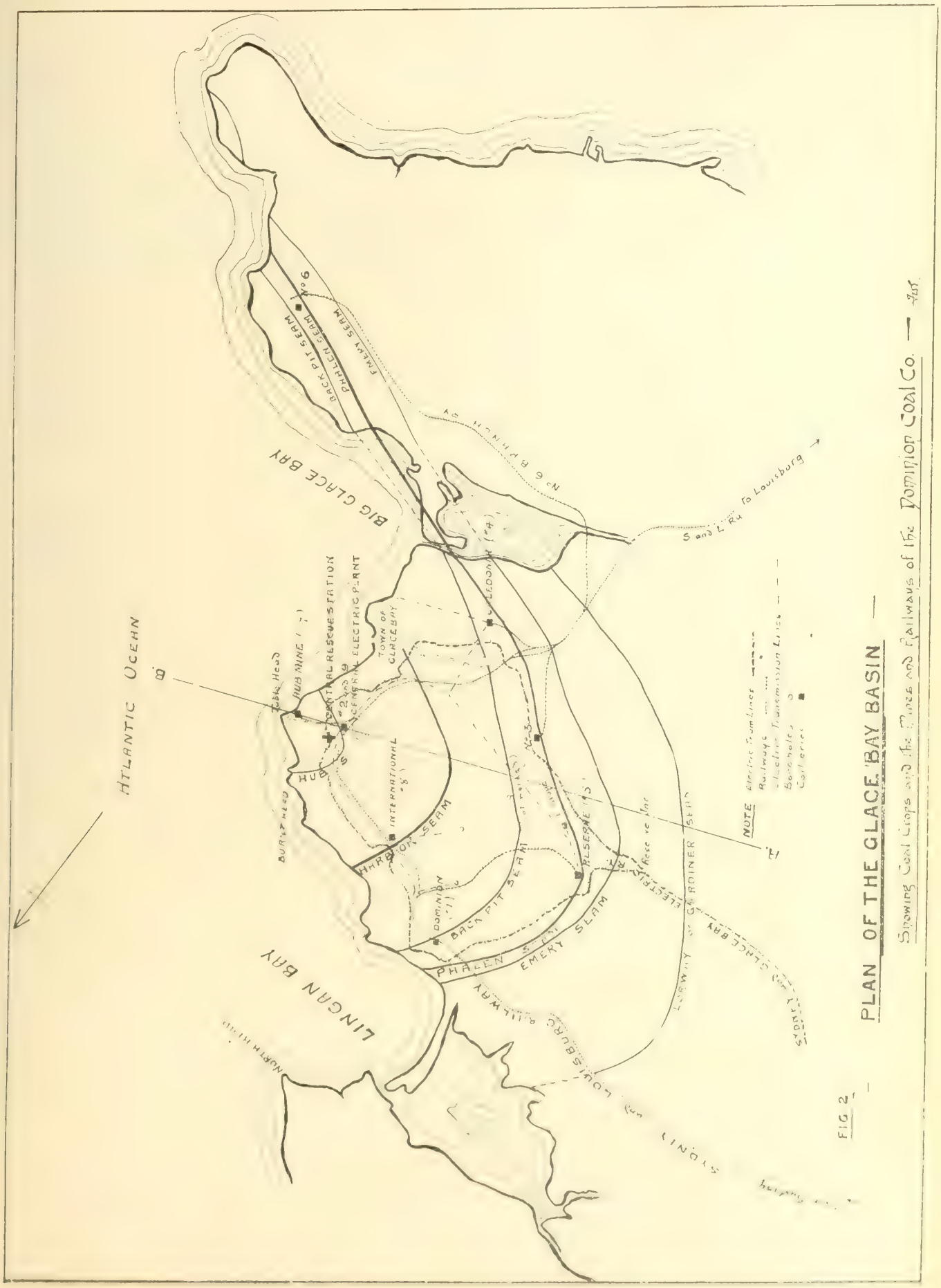
nized what their operations have meant to the trade of the Dominion generally, and the prosperity of Cape Breton in particular.

Taking the coal seams in the order of their relative importance, the Phalen seam first claims attention. It is worked from six collieries, commencing with No. 1 ("Dominion") at the western limit, and ending with No. 6 on the eastern side. The land area bounded by Lingan Bay on the west and by Big Glace Bay on the



east, is worked by the first five mines. No. 2 mine occupies the centre of the basin, while Nos. 1, 5, 3 and 4 workings cover the rise coal, radiating from west to east in the order given, like the spokes of a wheel. The territory on the other side of Big Glace Bay Lake is worked from No. 6 mine. Nos. 3 and 5 mines have an all-land territory, while Nos. 1, 2, 4 and 6 have submarine territory in addition to their land areas.

It is not necessary to give a detailed description of the general characteristics of the coal mined from the


ATLANTIC OCEAN
BIG GLACE BAY
LINGAN BAY
No 6 PHALEN SEAM
PHALEN SEAM
EMERY SEAM
BACK PIT SEAM
No 6 PHALEN SEAM
No 6 PHALEN Bay
S and L Ry to Louisburg
TOWN OF GLACE BAY
CENTRAL RESCUE STATION
ELECTRIC POWER PLANT
JOBS HEAD
HUB MINE
BURKE HEAD
INTERNATIONAL SEAM
DOMINION SEAM
BACK PIT SEAM
PHALEN SEAM
EMERY SEAM
ELSEPHINE SEAM
GARDINER SEAM
NOTE
Railways
Electric Transmission Lines
Bore holes
Coal areas
PLAN OF THE GLACE BAY BASIN
Showing Coal Crops and the Mines and Railways of the Dominion Coal Co. Ltd.
FIG 2.

Phalen seam, as they are so well known. Phalen coal is a rather friable, fat, bituminuous coal, with specific gravity of from 1.28 to 1.30. On account of its high heating value Phalen coal is in large demand for steam raising purposes, and it is a good coking coal, yielding a profitable return in bye-products when burnt in bye-product ovens.

We purpose dealing with each colliery in detail by itself, and will commence with No. 1, or as it is locally known, "Dominion."

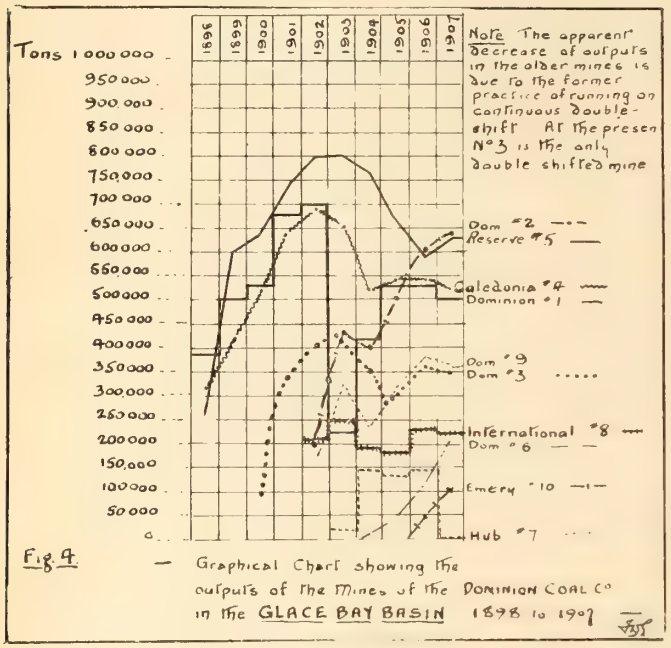


Fig 4 — Graphical Chart showing the outputs of the Mines of the DOMINION COAL Co in the GLACE BAY BASIN 1898 to 1907

Dominion No. 1 Colliery.

No. 1 colliery is the first mine that one meets in travelling over the Sydney & Louisburg Railway from Sydney to the colliery towns. It is in a district that saw the first beginnings of the Cape Breton coal trade, and is pleasantly situated overlooking Lingan Bar in the midst of a countryside that is a little more cultivated than the surrounding neighborhood. "Dominion"—not to make any invidious comparisons—has always been regarded more or less as the model colliery of the Dominion Coal Company, and its workmen, mostly life long residents of the neighborhood, are looked upon as men of light and leading, whose native conservatism is a little shocked at the crude modernity of "New Aberdeen."

The territory assigned to Dominion No. 1 was first worked at Old Bridgeport by the General Mining Association in 1830, the workings being largely confined to the crop area. The coal was shipped on the other side of Lingan Bay, being conveyed from the slopes by means of a railway that ran along the course of the Lingan sand bar. Trade proving bad the mine was abandoned by the General Mining Association in 1842, and the colliery was not operated again until 1886, when it was reopened by Mr. Henry Mitchell of Dominion, who continued to operate it under a sub-lease from the G. M. A., until his interests were absorbed by the Dominion Coal Company in 1893. The latter corporation continued mining operations at Old Bridgeport until 1898. They had erected a new bankhead at the time they took over the property, and produced from Old Bridgeport between 1893 and 1898 approximately 640,000 tons, at the end of which period they dismantled the mine.

In 1893 the Dominion Coal Company sunk the present shafts at Dominion No. 1, and equipped the colliery with modern machinery, since when Dominion has produced 5½ million tons of coal, and is at the present time hoisting between 50,000 and 52,000 tons per month on single shift.

There are three shafts, hoisting, material, and air shafts, the material shaft not being in use except for the conveyance of haulage ropes underground. The main hoisting shaft is divided into two compartments, one for hoisting coal and the other for men. It is 24 feet by 10 feet 6 inches inside the buntons, and is 158 feet deep. The cages are of the dumping type generally used by the Dominion Coal Company, running on the ordinary square wooden guides. The hoisting engine was made in Glasgow, and was installed in 1894. It is a horizontal hoist, 20 inches by 54 inches cylinders, having a drum 8 feet 9 inches in diameter with 5 feet 6 inches face. The hoisting rope is a six strand cast steel rope, 1⅜ inches in diameter, hoisting daily from 2,000 to 2,400 tons.

The man hoist was made by I. Matheson, of New Glasgow, and is a 16 inches by 32 inches horizontal engine with 6 feet drum.

The mine is ventilated through a circular air shaft 10 feet in diameter, connected with a Dixon fan of the Guibal type, 24 feet diameter with blades 6 feet 6 inches wide, 100 revolutions per minute, capacity 300,000 cubic feet per minute, at 2 WG., cased in brick and driven by a direct connected 18 inches by 28 inches "Buckeye" engine. The air shaft is used as a downcast, and the hoisting shaft as the upcast. This is the

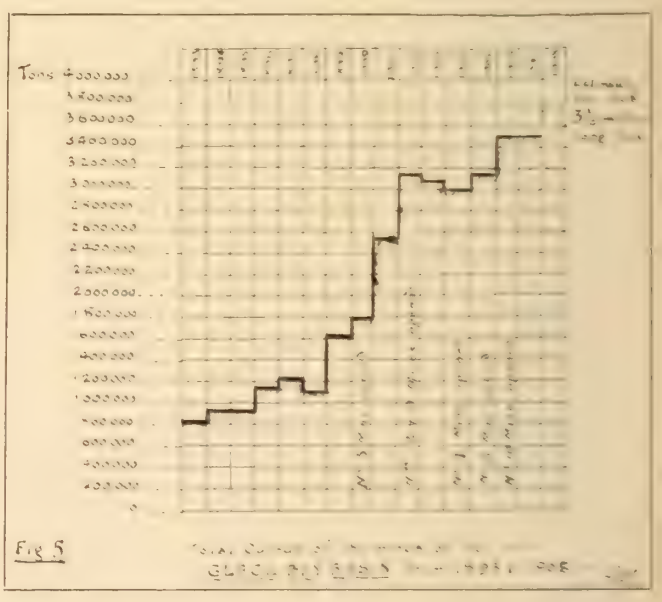


Fig 5

usual practice in Cape Breton, being so arranged in order to keep the pit mouth free from ice in the winter. The ventilation can be reversed at short notice if necessary. There are also two spare Murphy fans, 12 feet and 8 feet diameter respectively, which are not in use, but are reserved for emergencies.

The steam plant consists of seven Babcock & Wilcox boilers, having a total rated capacity of 1,696 horse power. There is one brick smoke stack 125 feet high, and one steel stack 74 feet high.



HUB MINE—No. 7 (HUB SEAM).

The haulage plant consists of two large haulage engines 28 inches by 60 inches cylinders. These engines were installed in 1901, having been formerly used on street railway traction in the City of New York. These engines operate two endless ropes, namely, the Angle Deep rope, 13,500 feet total length of 1¼ inch rope; and the South Deep rope, which is of the same diameter, and 17,500 feet in total length. The South Deep is within 1,000 feet of its full extent, and this haul will not be materially extended.

There are three Ingersoll compressors, having a capacity of 2,500 cubic feet per minute, each, two of which were installed in 1894 and one in 1900. There is also a small straight line compressor, wth a capacity of 900 feet, which was put down in 1903 at the time of the fire.

The surface and pit bottom are electrically lighted from an independent generating unit 100 kw., 250 volts.

The bankhead is a steel structure, housed with corrugated iron, and fitted with shaking screens and picking belts. It possesses no features out of the ordinary. Coal is fed directly to the boilers by two Robins belt conveyors, and there is also a small belt conveyor to the locomotive bunker pocket.

The other surface erections are those to be usually found at a colliery, and include a wash house for the men, a well equipped and new lamp cabin, and a fireman's hall, containing hose and reels, fire fighting appliances, and a parlor for the use of the colliery fire brigade in their moments of diversion. Chemical extinguishers of the "Fire King" pattern are distributed around the colliery, both above and below ground, and the fireman's hall will shortly be fitted with several Draeger apparatus, which will be kept in readiness for immediate use by the colliery rescue corps. The general fire fighting organization of the Dominion Coal Company will be dealt with fully in a separate notice.

Underground the mine is divided into two main districts, known as the South Deep and the Angle Deep. The South Deep district will work up to the barrier of No. 2 colliery, and the Angle Deep has a large submarine territory, the exact definition of which will depend upon the position of the Bridgeport Anticline, and the amount of dislocation attendant on this fold in the strata, which is as yet largely a matter of conjecture. At present the face of the Angle Deep leading place is advanced about 3,000 feet under the sea from the shore line, and about 800 tons per day of submarine coal is being mined.



DOMINION No. 2.



DOMINION No. 2.

The ventilating current is divided into two main splits at the bottom of the downcast air shaft and is sub-divided again on the south side of the mine. The Angle Deep is ventilated by a single split.

The pumping plant of the mine is as follows: One 20 inches by 8 inches by 24 inches Northey steam pump, one compound Northey pump, 12 inches and 24 inches by 8 inches and 24 inches. One six stage McDougall turbine pump, operated by power from the Central Power Station at No. 2 colliery. The steam for the Northeys is taken from the International boilers through a borehole into the Phalen seam. The three pumps discharge into a common borehole, which empties itself into the Harbour seam above, and is conveyed by means of the International water level to the shore. There is also a large Cameron pump that discharges into the sea through the opening that was made into No. 1 workings from the shore at the time of the fire. There is another large Northey pump on the surface for fire protection purposes and several other pumps for the colliery water supply.

The average force employed at the colliery is round 700 men. The horses number about seventy. The underground equipment consists of about 400 mine cars, 45 compressed air percussive pick mining machines, and about 22 "Little Hardy" shearing machines. The mine is fully equipped with Ackroyd & Best electrically lighted safety lamps, with magnetic locks. The underground workings are equipped with sufficient relighters, which are kept under individual and careful supervision.

An examination of the chart of outputs of individual mines, Fig. 4, will show a drop in the output of No. 1 in the years 1903 and 1904. This was caused by a fire, which broke out in the workings on the 19th of March, 1903, and getting beyond control, necessitated the flooding of the mine in order to extinguish the fire. The mine was unwatered on the 13th of June, 1904, but it was not until the middle of 1905 that the output regained its normal tonnage. A full description of the fighting of this fire, and the flooding and pumping operations that followed, will be found in a paper contributed to the Canadian Society of Civil Engineers by the late Shirley Davidson and Norman MacKenzie, the present superintendent of No. 2 district.

The next number of this series will deal with No. 5 Colliery (Reserve), No. 3 Colliery, and No. 4 (Caledonia).

(To be continued.)



RESERVE MINE No. 5, PHALEN: No. 10, EMERY SHAFT

THE SUMMER EXCURSION.

At our request, Mr. H. Mortimer-Lamb, secretary of the Canadian Mining Institute, has outlined the programme of this summer's trip.

"The excursion will start from the city of Quebec either very early on the morning of August 24th (probably shortly after midnight), or early on the morning of the following day, in order that the party may have an opportunity of viewing the scenery along the Bay of Chaleur, which will thus be passed in daytime. Two whole days will be spent in Sydney visiting the steel works and collieries in the vicinity; and one day at Stellarton. Possibly the party may visit Halifax; but all the arrangements in connection with the Nova Scotia visit will be made and carried out by the Mining Society of Nova Scotia, who have kindly offered to consider the Institute and the European representatives as its guests during our stay in that province. It is designed that we shall reach Sherbrooke on Monday morning, August 31st, and leave immediately by the Quebec Central for Thetford and Black Lake, where a day will be spent visiting the asbestos mines. Leaving Sherbrooke early in the morning of Tuesday, September 1st, we arrive in Montreal at noon and spend a day and a half in the city, leaving for Toronto at 10. p.m., on September 2nd. On September 3rd, an ex-

cursion will be made to Niagara Falls, while on the 4th, the party will have an opportunity of visiting the Toronto Exhibition and will be entertained at luncheon by the directors. Leaving Toronto that night, we proceed, via North Bay, to Cobalt and will spend a day there, leaving in the afternoon of September 6th for Copper Cliff, and spending the evening of that day in Sudbury. It is then proposed to have the cars taken, during the night, to Moose Mountain, where the morning of September 8th will be spent. We then go on to Winnipeg, arriving at night on the 10th, and leaving the following morning at noon. At Medicine Hat, a special train will be chartered to take the party as far as Lethbridge, and on the 13th we visit Frank and Blairmore; on the 14th, Fernie; on the morning of the 15th, the St. Eugene at Moyie, arriving at Rossland that same night. A day will be spent at Rossland, and on the 17th, a visit will be paid to the Trail smelter en route to Nelson. Friday, September 18th, will be devoted to visiting Bonnington Falls, and to points of interest in the vicinity of Nelson. Two days will then be spent in the Boundary district, whence the party will journey direct to Victoria, where two days will be spent, leaving on the evening of the 25th of September. After spending a few hours in Vancouver, we are due at Banff on the evening of Sunday, September 27th. At Banff, the party will possibly be entertained at luncheon or dinner by the Government of Alberta. On the return journey, it may be possible to arrange for a visit to the Atikokan iron mine and furnace. The programme, as at present arranged, contemplates the arrival of the party at Montreal on October 2nd.

"The above in brief covers the arrangements as so far made, but details, of course, have yet to be worked out. Upwards of ninety provisional acceptances have been received from members of the several British societies to whom invitations were issued; while in addition, several members of these societies residing in the United States, have also signified their intention of participating. It is scarcely likely, however, that all will come, but definite assurances are expected not later than July 1st. It depends on the number of persons taking part whether, or not, we shall be able to charter a special train for the whole trip, but meanwhile, the railway companies have offered a special rate of half fare. Great interest is being manifested in the excursion to Great Britain, and it may be noticed that at the recent annual dinner of the Institution of Mining and Metallurgy special reference was made to it in a speech by Earl Crewe."

Annual Report of the Provincial Mineralogist Upon the Mining Industries of British Columbia for the Year 1907.

The year 1907 saw the greatest total production on record from the mines of British Columbia. Early in 1908, the "Canadian Mining Journal" gave an abstract of the mineral output The report before us, however, contains a great deal of material that demands attention.

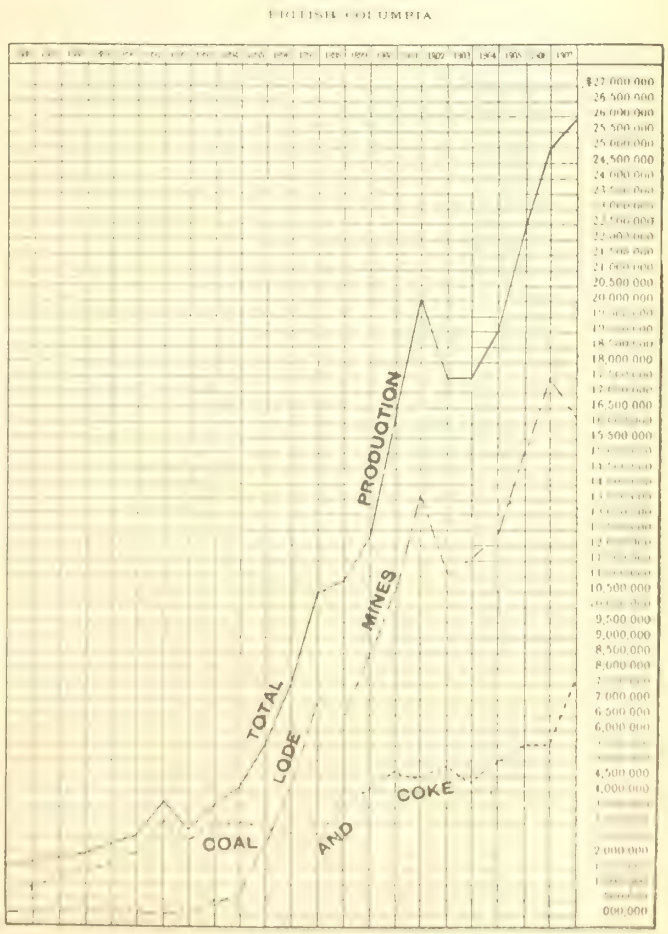
By the established custom of the Provincial Bureau of Mines in estimating the output of the lode mines, the output of a mine for a year is considered as that amount of ore for which smelter or mill returns have been received. This, obviously, does not include all of the ore mined. December ore shipments to the smelter are usually carried over to the new year. This gives rise to but a small error, as where necessary, it is uniformly carried over from year to year.

In calculating the values of the products, the average price for the year in New York has been used as a basis. For silver 95 per cent., and for lead 90 per cent., of such market price has been taken. Treatment and other charges have not been deducted.

The increase in value of mineral production of 3.6 per cent. over 1906 is due to the greater tonnage of of low grade ore mined in the Boundary district and to increased tonnage from the collieries. The total for 1907 is $25,882,560 The high market price of metals in the former half of the year was offset by low prices in the latter half.

The tonnage of ore mined during 1907 was 1,804,114 tons, of which the Boundary district produced 65.1 per cent.; Rossland, 15.8; Coast, 4.7; Fort Steele, 8.6; and all other districts 5.8.

Of 147 shipping mines, only 72 shipped more than 100 tons each.



Two thousand, five hundred and eighty-five men were employed underground and 1,112, overground in these mines.

Sixty-one non-shipping mines employed 119 men underground and 127 overground.

Up to the end of 1907, British Columbia has produced coal to the value of $86,972,511, placer gold to the value of $69,549,103 and lode gold to the value of $45,070,717.

The total mineral production for 1907 was more than double that of 1899. The value of the total products of the mines of the province up to the end of 1907 is $299,526,282.

For twenty years coal mining has been a constantly increasing industry. Lode mining, beginning in 1894, has now risen to the $17,000,000 mark, but has been subject to many fluctuations.

Coal.

The fall in silver and lead production, in fact in both branches of gold production and copper also, was more than compensated for by the increased quantity of coal mined. One million, eight-hundred thousand and sixty-seven long tons of coal valued at $6,300,235; and 222,913 long tons of coke valued at $1,337,478 were the figures for the year. The gross output, however, was higher than this, being 2,219,608 long tons of coal. Of this quantity, 44,760 tons were added to stock; 916,262 tons were sold for consumption in Canada; 673,114 tons were exported. Thus the total coal sales for the year were 1,589,376 tons. Of the balance, 419,541 tons were used in making coke and 165,931 tons under colliery boilers.

The Coast collieries mined in 1907 some 1,342,877 tons of coal. Of this, 44,760 tons were added to stock, bringing the coal distributed down to 1,298,117 tons, thus:

	Tons.
Sold as coal in Canada	698,041
Sold as coal in the United States	359,666
Sold as coal in other countries	22,038
Total used as coal	1,079,745
Used under companies' boilers, etc.	121,701
Used in making coke	96,671
	1,298,117

The home market showed an increase of 31.4 per cent. over last year; the United States market a decrease of about 17 per cent.

The Crow's Nest Pass Coal Company, the only operating company in the Rocky Mountain coal field, mined 876,731 long tons during 1907, of which the following distribution was made:

	Tons.
Sold as coal in Canada	218,221
Sold as coal in United States	291,410
Total sold as coal	509,631
Used by company in making coke	322,870
Used under company's boilers, etc.	44,230
	876,731

The amount of coke made from the 322,870 tons of coal used was 206,541 tons (2,240 pounds), of which 5,664 tons were carried over as stock and 200,877 tons sold, 140,987 tons for consumption in Canada, and 59,890 tons exported to the United States The oven yield of coke was 63.9 per cent.

Gold.

Placer gold production for 1907 was about $828,000, a decrease of $120,400 or 12.7 per cent., as compared with 1906. The Atlin district is the principal producer. Three -hundred and forty thousand dollars worth of gold paid royalty here during 1907. The Cariboo district produced $350,000. Dease Lake in the Stikine district, was a disappointment. The lower Fraser and the Thompson river produced practically nothing.

The value of the gold produced from lode mining in 1907 was $4,055,020, a decrease of $575,619 or about 12.5 per cent. About 95 per cent. of the gold is recovered from smelting copper-bearing ores. The only stamp mill of any importance is at Hedley, in the Osoyoos mining division, which mined and milled about 32,000 tons of ore, from which was recovered about $475,000.

Silver.

The total silver output for 1907 was 2,745,448 ounces, valued at $1,703,825, a decrease of 244,814 ounces and $193,495 in value.

About 72 per cent. of the silver produced is found associated with lead, in argentiferous galena, the remainder being found in conjunction with copper-bearing ores.

The Slocan district, including Ainsworth mining division, provided 32 per cent. of the total Provincial output, and Fort Steele mining division 30 per cent., all from argentiferous galena.

Lead.

Forty-seven million, seven hundred and thirty-eight thousand, seven hundred and three pounds of lead, valued at $2,291,458, were produced, a decrease of 4,669,514 pounds and $376,120 as compared with 1906.

	Pounds	Per cent of Total.
Fort Steele mining division	37,526,144	= 78.61
Slocan	4,305,826	= 9.00
Ainsworth	3,654,775	= 7.66
Nelson	1,582,113	= 3.32
All other districts	669,795	= 1.41
	47,738,703	100.00

Copper.

The output of copper for 1907 was 40,832,720 pounds, having a gross value of $8,166,544. As the larger coper-producing mines were only run for nine months, the output is slightly smaller than for the preceding year.

	1907 Pounds	Per cent.
Boundary district	31,521,550	= 77.2
Rossland district	5,080,275	= 12.4
Coast and Cassiar district	3,757,967	= 9.2
Yale-Kamloops district	36,120	= 0.1
Nelson district	434,222	= 1.1
Other districts	2,586	= 0.0
	40,832,720	100.0

Other Minerals

Practically no iron ore was mined, with the exception of 1,500 tons of bog iron ore mined and shipped

from Quatsino sound. The deposit was found too shallow for profitable work.

Zinc ore mining was stationary. The Lucky Jim mine in the Slocan, shipped 1,120 tons of ore mined in 1906, but no fresh mining was done. Zinc blende concentrates from Slocan district were produced but neither sold nor treated. The Legislature advanced $10,000 to aid in completing the Nelson plant of the



ROCK FORMATION—ENTRANCE IKEDA BAY, Q.C.I.

Canada Zinc Company. The power for this plant is obtained from Bonnington Falls.

The building stone and brick industries are increasing. Fire brick, fire clay, lime-silica brick, lime and cement are the bases of incidental activities.

The staff of the Bureau consists of the Provincial Mineralogist, the Provincial Assayer, a junior assistant in the Laboratory, and a clerk as temporary assistant during the publication of the Report.

The Provincial Mineralogist visited Ashcroft, Highland Valley, Nicola Valley, Quatsino Sound, Queen Charlotte Islands, Atlin and other districts during the summer.

In May and in December the examinations for assayers were held.

Assay Office.—During 1907 assays are quantitative determinations to the number of 905 were made. Total cash receipts were $1,057. A large number of free qualitative determinations were performed. Only 4 candidates for asayers' certificates wrote on the examinations. Three were successful.

The "Coal Mines Regulation Act" provides that all the officers of a coal mining company having any direct charge of work underground, shall hold Government Certificates of Competency, obtainable only after passing an examination before the Managers' Board. These certificates are First, Second and Third, respectively Manager's, Overman's, and shiftboss, fireboss, or shotlighter's certificate. From three to five years' practical experience is called for before candidates are eligible for examination. Fifty-two out of 56 candidates were successful.

Cariboo District.

A slight increase in the hydraulic gold output was recorded for this district. Coal was discovered in Bear River, about 15 miles from the Fraser. In Quesnel mining division of this district the Consolidated Cariboo Hydraulic Mining Company's property at Bullim, taken over by the Guggenheims in 1906, was abandoned by them.

Cassiar District.

Atlin mining division had a good year. Although 100 fewer men were employed the gold output was not materially reduced. Scarcity of water and labor interfered with what should otherwise have been an unusually good season.

The Stikine and Liard mining divisions had an exceptionally light year.

In Skeena mining division are the Queen Charlotte Islands. The mining activities on Moresby Island have been described in the "Canadian Mining Journal" of recent date.

The other mining districts to the south are reported upon and their year's progress recorded. We need not go over these. They have had regular attention in our columns.

Accidents.

In the metalliferous mines of British Columbia there were 94 accidents in 1907. Out of this total 20 were fatal, 20 serious, and 54 slight. Of the fatal accidents, four were attributed to drilling into old holes containing powder. One serious and one slight accident are also set down to the same cause. The source of the largest number of underground accidents (most of which were slight) was falling rock in stopes, levels, etc. For each 100,000 tons of ore mined there was a total of 5.22 accidents (1.11 fatal, 1.11 serious, and 3.00



NO. 2 TUNNEL, LILY GROUP, IKEDA BAY, MORESBY ISLAND.

slight). For each 1,000 men employed there were 25.4 accidents (5.4 fatal, 5.4 serious, and 14.6 slight).

Looking up the corresponding tables for 1906 we find that there were in that year fewer accidents, only 60 altogether. For each 100,000 tons mined in 1906, only 3.06 accidents occurred, of which only 0.86 was fatal. For each 1,000 men employed there were 15.38 accidents of all classes, 4.61 of which were fatal.

The collieries of the province recorded 154 accidents for the year—31 fatal, 61 serious, 62 slight—a greater number than has occurred since 1902.

Falls of coal were responsible for 8 fatal accidents. Mine car fatal accidents reached the same number and both serious and slight accidents due to this cause, exceeded those from all other individual causes. Explosions of gas caused but one death. There were 6,059 persons employed and 2,219,608 tons of coal produced.

ORES AND ROCKS OF THE COBALT REGION.

By R. E. Hore.

The exploration of the larger areas of silver and Cobalt bearing rocks has disclosed new types of deposits, and has afforded additional information regarding the origin of the deposits and of the rocks containing them. It is the purpose of this article to give some results of study in field and laboratory.

In Coleman township interpretation is difficult on account of the variety of formations—Lower Huronian sediments, Keewatin volcanics, and Post-Middle-Huronian Diabase—in which the silver-cobalt deposits occur. In other parts of the area a less promiscuous distribution of the ore has been found.

The deposits in Casey Township are in Lower Huronian, a few hundred feet from diabase. Those of Pense and Ingram townships are confined to diabase, as are also those in the Elk Lake and Anvil Lakes districts of the Montreal River Mining Division, and the deposits of Portage Bay and Anima Nipissing. Lately discovered deposits south of Lorrain township are said to be in rocks of Keewatin age.

The Diabase.—The intimate connection of the ore deposits with this rock becomes more and more apparent as prospecting advances. For some time it has been the "nishishin sini" of the prospectors. It occurs for the most part in large sills of a few hundred feet in thickness. In the Temagami Reserve the writer has examined a large number of diabase hills which stand from one to two hundred feet above the surrounding country. In several instances the contact with greywacke slate was found, and in all cases it is near the base of the hills. Since the texture of the diabase at the summits is generally quite coarse, it is probable that the original thickness was at least double the height of the present hills.

For the most part the sills are dark grey in color and holocrystalline, the chief minerals being plagioclase feldspars labradorite in many cases) and monoclinic pyroxene. Quartz and ilmenite are frequently present. Near the edge of the sheet it is very fine grained and ophitic texture is more pronounced; but the grain becomes quite noticeable a few feet from the contact. In more coarsely grained portions, often pink in color, quartz is more abundant and generally is found in micrographic intergrowth with feldspars. In petrographical character and in its relation to the Huronian sediments, the diabase is remarkably similar to those of Lake Superior which are regarded as Keweenawan,[1] being the plutonic contemporaries of the copper bearing lavas, or as post-Keweenawan in age.[2]

Veins in the Diabase.—Veins in these sills are not common, and quartz veins are more abundant than calcite. In Coleman township the rich veins have little gangue mineral, in some cases native silver occurring simply in thin sheets along the joint planes; but what little gangue there is is calcite. In other areas some of the quartz veins are cobaltiferous; but the valuable deposits as a general rule have calcite gangue. Argentiferous galena occurs in some of the quartz veins west of Wakmika Lage, along with pyrite and chalcopyrite and a later filling of pale pink calcite. In the Elk Lake district barite veins are said to be argentiferous. All the veins are vertical or nearly so, and probably represent fillings in tensional joints due to cooling and contraction of the igneous sheet.

Intrusives in the Diabase.—There occur in the sills small dikes, some more basic, others more acid than the main mass. In Coleman township there are fine grained dark colored dikes of olivine diabase, while near Temagami there are narrow dikes of diabase porphyry.

More frequent, and of greater economic interest are the light colored aplites. The width of most of these is to be measured in inches, while in length, they are but a few hundred feet. They are frequently mineralized, pyrite, chalcopyrite and galena being present in many, while silver and cobalt minerals have been found in them in the Elk Lake area. They are composed largely of quartz, orthoclase and acid plagioclases; but the proportions vary considerably in the same dike. There is considerable chlorite in darker colored portions, and calcite fills interstices between the other minerals. Small crystals of titanite and apatite are inconspicuous but characteristic constituents.

Disseminated Ore in the Diabase.—In the diabase which extends westward from Anima-Nipissing to Lady Evelyn Lake there are numerous showings of cobalt minerals, both in calcite veins and as disseminated crystals in the rock. There is generally little or no surface indication of the presense of the latter; but on fresh fractures traces of cobalt bloom are found. One deposit, west of Diabase Lake, is associated with an aplite vein. The vein contains some pyrite, but little smaltite. Parallel to the vein for a few feet from its walls the diabase contains disseminated crystals of smaltite, which are more concentrated near joint planes. The chief primary constituent of the ore-bearing rock is feldspar. The smaltite crystals are embedded in calcite and chlorite, and are accompanied by small crystals of titanite.

Another cobaltiferous specimen from this region shows some kernels of augite still undecomposed, and a remarkably high percentage of ilmenite.

Origin of Disseminated Ore.—To the naked eye the detection of smaltite in the diabase suggests the possibility of its being an original constituent. The altered character of the ore-bearing portions and the association with aplite, suggest that the ore had its origin in the gases or hot solutions which accompanied these late secretions of the cooled differentiated magma.

Microscopic examination shows that the smaltite is embedded in secondary minerals and seldom in the undecomposed feldspar. In the latter case high magnification shows numerous small cracks in the feldspar. Some of these are filled with calcite and apparently have acted as channels to introduce the smaltite, so that the latter is secondary.

The absence of augite and the presence of chlorite, which is probably the result of decomposition of the former, suggests that the augite is cobaltiferous; but a specimen of the rock showing augite cores was found to contain no trace of cobalt.

Lower Huronian.—These rocks, like the slate-conglomerate of the original Huronian area north of Lake Huron, represent the result of disintegration and de-

composition of Laurentian and Keewatin. Quartz and great degree of chemical decomposition. Quartz and feldspars are the chief constituents, while chlorite and micas are more abundant in dark colored types. Calcite is seldom found except in the vicinity of veins and apparently did not play an important part in cementing the sand grains.

It has been stated[3] that these rocks are the debris of Keewatin rocks and so play a similar role in formation of the ore deposits, especially in supplying the calcite gangue. The rocks are indeed of such a character that they represent more nearly than do some sediments the composition of the rocks from which they were derived. The very process of their formation, however, would remove some of the more soluble constituents in solution, thus making a deposit relatively inactive, since of more stable and less soluble constituents. Perhaps a more important cause of difference is that the acid igneous rocks of the Laurentian must have contributed largely to the Huronian sediments. It follows, therefore, that if, in virtue of their mineralogical composition, the Keewatin volcanics play an important role in the ore deposition, the Huronian sediments play the same role in but a minor way, if at all.

It is sometimes stated[4] that there is reason for believing that much of the Huronian rocks is of volcanic origin, and represents consolidated ash. If this were true there would be doubtless present many constituents that are unstable in the zone of weathering. Permeating waters would cause many chemical changes, and resulting solutions would be important factors in ore deposition. The rock specimens examined, however, do not show fragments of glass nor minerals characteristic of volcanic tuffs, and there is no conclusive evidence of igneous material introduced contemporaneously with the Lower Huronian sediments.

There is evidence[5] that some of these sediments are glacial deposits. Such material represents very closely the composition of the original rocks. The chief difference between these deposits and the Keewatin rocks would be in their disintegration (and consequently greater ease of decomposition) and admixture with debris of the Laurentian. The examination of a large number of unconformities shows that the basal conglomerate and the underlying surface are by no means similar to that of glacial deposits, while the regular gradation from feldspathic quartzite to the upper conglomerate beds is also not easily explained by that hypothesis. On the other hand, the boulders of the upper conglomerate may be the erratic deposits of drifting ice. It seems likely that glacial debris, if present at all, forms but a small proportion of the sediments.

These rocks then, although not extreme types of weathering, are composed largely of minerals that are stable in the zone of weathering and are far less active than the Keewatin volcanics in ore deposition.

Keewatin.—In Coleman Township this formation is chiefly represented by dark colored, fine grained, basic volcanic rocks. In Harris and in Tudhope there are outcrops of the same nature. Sedimentary types, as well as igneous, are represented at Larder Lake by the auriferous carbonates and at Temagami by carbonates and iron-bearing cherts. The writer has not yet seen cobalt deposits in diabase or carbonates where these are closely associated. This suggests that the volcanic rocks supplied elements other than the carbonate gangue.

The numerous rich veins in Keewatin at Cobalt are not far distant[6] from the diabase sill, while in some cases a vein traverses both formations. The veins in Huronian are in no case more than a few hundred feet from Keewatin. On the other hand numerous areas of greywacke in contact with diabase where there are no Keewatin exposures have always proved barren, even though the diabase is known to be cobaltiferous, as at Lake Wendigo. The same is true of the feldspathic quartzites of Anvil Lake and James Township. The conclusion is that the Keewatin volcanics are an important factor in the ore deposition.

Conclusion.—The ores originate in the diabase. While it has been shown[7] that silver is deposited later than cobalt minerals, the occurrence in aplite indicates that there was no great time interval. Keewatin volcanics assist in the ore deposition, while the Lower Huronian sediments are relatively inactive. The part played by the Lower Huronian is primarily that of a recipient for the ores, and, by virtue of their regular vertical jointing, they carry more valuable deposits than do the irregularly fissured Keewatin rocks.

Prospecting should be fruitful in areas which show Keewatin volcanics in association with the Diabase sills, and especially so where Lower Huronian sediments are also present. There is little doubt that there are many such occurences between Lake Temiskaming and Lake Huron.

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[1]Lane, A. C. Geol. Rep. Isle Royal. Mich. VI. Pt. I., pp. 219, et seg.
[2]Lawson, A. C. Bull. No. 8 Geol. Sur. Minn., p. 47.
[3]Van Hise, C. R. Jour. of the C. M. I., X., 1907, p. 51.
[4]Bell, R. Jour. of the C. M. I., X., 1907, p. 63. Miller, W. G., Rep. Bur. Mines, Ont., 1905, Pt. II., pp. 47-48.
[5]Coleman, A. P. Jour. Geol., XVI., 2., Feb., 1908.
[6]See Prof. Miller's map of Cobalt area.
[7]Campbell, C., and Knight, C. W., Econ. Geo., I., 1906.

THE CHAMBERS-FERLAND MINING COMPANY'S PROPERTY.

A long protracted dispute as to the ownership of the Chambers-Ferland property was settled last year. The title was secured to the present owners; but the government imposed a royalty of 25 per cent. on the future output of the mine. Last summer a certain amount of surface prospecting was performed. Otherwise, beyond two shafts now being sunk, there is no development work done.

The organization of the Chambers-Ferland Company and the announcement that shares are soon to be placed upon the market, have created much interest. Following hard upon the heels of the La Rose flotation, Chambers-Ferland will undoubtedly receive much attention.

Because of this, the "Canadian Mining Journal" has got together all available information and, is presenting it to its readers, with the object of giving them as impartial an account of the property as it is possible to obtain.

The holdings of the company comprise 124 acres practically surrounding La Rose. As will be seen by the cut accompanying this article, the property is bounded on the south and east by La Rose extension, on the southeast and north by the O'Brien and La Rose, on the west and south by the Right of Way, Nipissing and O'Brien mines.

Although, as remarked before, very little work has been done on the Chambers-Ferland, yet, because of its position, definite results have been obtained from the little done.

For instance, the main vein of La Rose has been traced across the Right of Way over onto this property. An extension of the O'Brien main vein has been cut and a seventy-foot shaft has developed a fair body of ore. Besides these veins there have been at least nine other so-called veins cut, some displaying high-grade ore and some otherwise.

The preponderating number of veins found in the Huronian throughout the district has led to the conclusion that properties lying in this geological horizon are more valuable than others not so situated. With the exception of a few acres all of the holdings of the Chamber-Ferland lie in Huronian. Hence prospecting will be conducted with a strong expectation of good results.

Mining should be reasonably cheap as eight or nine veins, grouped on either side of one shaft will be worked together. Not all of these veins are payable, neither is there good ground for the statement that ore shoots on contiguous properties are continuous for over 1,000 feet. As a matter of fact, there is no evidence that would lead one to postulate ore shoots of more than a few hundred feet. However, such ore shoots are found to recur in close succession. This fact, applied to Chambers-Ferland will modify any speculative estimates to ore reserves. Positive reserves, of course, there are none. But the developments in La Rose, O'Brien and Nipissing lend a value to Ferland-Chambers possibilities. Although "ore in sight" is a phrase applicable only to bodies developed on three sides, yet the next best thing is ore from veins traversing a property from developed neighboring mines. In other words, high probabilities have a commercial significance only second to established fact.

We have seen no estimates touching the probable cost of mining the cost and visible supply of timber, the cost of the necessary machinery, and buildings. These and many more such facts should be included in the report and given to the public.

Several Cobalt mining engineers when asked for an opinion regarding Chambers-Ferland, spoke very highly as to its possibilities. This is well. An opportunity is now before the promoters of the flotation to set a standard for clean and business-like methods. If advertisements are necessary, let them be couched in decently moderate language. Also let them, in every respect, conform to the requirements of the Companies' Act. Moreover, reports of progress, expenditure, and income should be made public at regular intervals.

The capital of the new company is $2,500,000, in shares of the par value of $1 each. Three hundred thousand dollars is to be reserved as treasury stock. The officers and directors are: President, W. C. Chambers; vice-president, Harper Armstrong; secretary-treasurer, Alex. Fasken; directors, W. B. Russell, Arthur Ferland, George H. Sedgwick and Archibald T. Struthers.

THE OCCURRENCES OF TUNGSTEN ORES IN CANADA.

By T. L. Walker, University of Toronto.

(Ottawa Meeting of the Canadian Mining Institute, March, 1908.)

In 1904 the Geological Survey of Canada issued a bulletin on the occurrence of molybdenum and tungsten[1] in Canada. At that time the known occurrences were the following: Inverness and Queens Counties, N. S., Beauce County, P. Q., and a reported occurrence of wolframite in a boulder on Chief's Island, Lake Coutchiching, Ontario. More recently[2] Mr. R. A. A. Johnston, curator of the Geological Survey's museum, has recognized scheelite in the heavy sands from gold washings in the Yukon, while wolframite, scheelite and hubernite have been found in the tin deposit near New Ross, Lunenburg County, N. S.

Occurrences Already Recorded.

Slocan district.—In the reports of the Minister of Mines for British Columbia several localities have been indicated. The report for 1903[3] mentions the discovery of masses of scheelite occurring in vein quartz in the form of lenses at the Meteor mine in the Slocan district. The lenses vary in length from one to three feet, a total of 500 pounds being saved after the identification of the mineral.

In the subsequent reports of the Minister of Mines no reference is made to the production of scheelite in this district. The occurrence of scheelite or of other tungsten minerals in silver lead veins is unusual.

Cariboo district.—In 1904 an important discovery of scheelite was made on Hardscrabble Creek in the Cariboo district. Mr. Akin first discovered this mineral in the black sands obtained in gold washing and later succeeded in locating the scheelite in place. He describes the geological occurrence as follows:[4]

"This consists of highly altered country rock, the scheelite being scattered through it in small patches, but it is in the quartz stringers that most of the mineral is found. Some of these, varying from one inch to four inches wide, contain about one-third scheelite, with a little galena, and products of decomposition of iron pyrites. This zone appears to be from 12 to 20 feet wide, as determined by work done up to July, 1904, and gives every promise of turning out a valuable deposit."

After experimenting on the concentration of the scheelite by washing, a quantity was sent to Chicago to be tested and as a result of these tests was stated to be worth $460 per ton at the prices then current.

Promising as this report seemed it does not appear from the later reports of the Minister of Mines to have been followed by active development.

Occurrences Not Previously Reported.

Wolframite—Sheep Creek, B. C.—In the vicinity of Salmo in British Columbia some of the gold quartz veins carry considerable proportions of wolframite, specimens of which were collected recently by the writer from mines on Sheep Creek. The wolframite on ex-

amination in the laboratory was found to have a specific gravity of 7.137. With it are associated ferruginous quartz and wherever the mineral has been exposed to secondary action, yellow more or less powdery tungstite occurs. On chemical examination the following result was obtained:

WO_3	74.90
FeO	17.75
MnO	2.75
CaO	1.52
MgO	2.66
SiO_2	1.02
Total	100.60

So far as I am aware no economic use has been made of this material. I had not an opportunity of examining the mode of occurrence personally, the material being given me as coming for the Kootenay Belle mine, though its nature and value appear to have been unknown at the time.

Tungsten and scheelite.—Sheep Creek.—The writer has elsewhere[4] described in detail the occurrence of masses of hydrated oxide of tungsten in the gold quartz veins of the Kootenay Belle mine. The tungstite appears in more or less reniform concretionary masses in the vein associated with wolframite and scheelite, from which it was derived by alteration. In the tungstite specks of native gold may be observed. It was as gold ore that this auriferous tungstite along with the accompanying gold quartz was shipped. I have reason to believe that in the subsequent treatment the tungsten values were not recovered even when they were very much more valuable than the gold contents.

From an analysis of the tungstite-wolframite-scheelite ore in the laboratory the following results were obtained:

	Per Cent.
WO_3	86.20
FeO	1.20
CaO	.54
Fe_2O_3	4.14
Water	7.72
Total	99.81

The tungstite is golden yellow in color and very heavy—pure tungstite 5.517 and of some of the ore specimens nearly as heavy.

St. Mary's River, B. C.—Recently Mr. E. Walter Widdowson, assayer of Nelson, B. C., showed me a very fine specimen of crystallised wolframite from the St. Mary's river north of Cranbrook. I do not know anything of the quantity of this mineral available and am unable to say whether it be an economic deposit or not.

Scheelite from Victoria Mines, Sudbury District, Ontario.—At the Victoria mines of the Mond Nickel Company in 1904 Mr. T. M. Paris, assayer for the company, presented to me a few small fragments which he had determined as scheelite. I do not know anything as to the mode of occurrence, but so far as I know this is the only place in the Sudbury dictrict where tungsten mineral has ben found. The general studies of the genesis of the Sudbury ore deposits lead us to anticipate the occurrence of such minerals as scheelite.

The mineral is quite white and of very vitreous lustre; specific gravity 6.167. On the fragments in my possession no crystal surfaces are visible, but from the continuous cleavage surfaces it is probable that they are crystal fragments.

A chemical analysis showed that the mineral is exceedingly pure.

	Per Cent.
WO_3	79.36
CaO	19.96
Total	99.32

Conclusion.—The ever increasing importance of tungsten in the industries calls for an examination of these various Canadian occurrences with a view to determining their possible economic value. Within the past year the government of the United States has appointed an officer to examine and report on such occurrences within their borders. In Canada we know of tungsten minerals only as specimens and curiosities and as those engaged in developing properties do not know these minerals or their value, such an appointment might be beneficial in many ways.

[1] Molybdenum and Tungsten, by R. A. A. Johnston and C. W. Willmott, 1904.

[2] Summary Report, Geological Survey of Canada, 1907, p. 82.

[3] Report of the Minister of Mines, 1903, p. 138.

[4] Report of the Minister of Mines, 1904.

[5] American Journal of Science, 1908.

A NEW IRON ORE FIELD IN BRITISH COLUMBIA.

By John E. Hardman, S.B. Ma.E., Montreal, Que.

Ottawa Meeting Canadian Mining Institute, March, 1908.

The discovery of large deposits of iron ore near the shore of the Bay of Chaleur, in the province of New Brunswick, in formations belonging to the Pre-Cambrian, or Cambro-Silurian, period comes as a surprise both to geologists and mining men, who hitherto may have regarded New Brunswick as containing less profitable mineral wealth than any of the other provinces. When to this statement is added the further one that, the present facts indicate the probability that this district contains as large, or larger, deposits of merchantable iron ore as have hitherto been found in the Dominion, there will be no excuse needed for presenting to the notice of this Institute a preliminary, and somewhat fragmentary, account of the field.

No geological reconnaissance of this portion of New Brunswick has been made (so far as the publications of the Survey show) since the seasons of 1879 and 1880, when Dr. R. W. Ells examined the district as well as could then be done by canoe traverse of the principal streams which flow into the Bay of Chaleur. The county of Gloucester was then, and in parts is to-day, a wilderness which is traversed in the winter only by

trappers and lumbermen, and in the summer time by sportsmen, for the river and its tributary streams have long been choice ground for salmon and trout fishing.

The district under consideration lies approximately along the meridian of 65 degrees 50 feet West Longitude, and the parallel of 47 degrees 25 feet North Latitude, and is near the southern boundary of the county of Glouchester. The limits of the field have as yet been by no means defined or determined, but may be taken, according to present knowledge, as having an extreme length of some 20 miles north and south, with a width of not less than 5 miles. This extreme length takes in the field on the "Mill Stream" (so called) lying some 8 to 9 miles northwest of the town of Bathurst, as well as the portion, which is hereafter described more fully, on the northern bank of the Nipisiguit river. The larger section has an area of approximately 30 square miles. There is a linear gap of about 16 miles between the Nipisiguit area and the small area on the Mill Stream.

The rocks in which these deposits of iron ore are found are all metamorphosed or crystalline. They have been mapped as Pre-Cambrian,and belong, probably, to one of the Huronian members.

In a general way they consist of micacaeous and chlorite schists and slates with some quartzites. They are infrequently cut by small veinlets of quartz, and are also infrequently penetrated by dikes of jasper.

The surface rock about the outcrops is a mica schist, but the immediate hanging wall of the deposit is igneous, being a gabbrodiorite; the underlying rock or foot wall is a completely altered rock showing,under the microscope, only chlorite and muscovite, and its origin is uncertain, but is suggests (as is shown in the hanging) that it comes from a true volcanic.

The foot wall rock is filled with cubic crystals, both large and small, of pyrite on the edge near the body of iron ore, but its lower portion is more free from this metallic sulphide. The structural and stratigraphical relations remain to be worked out.

The designation of the ore found in this field is best given by the words "Magnetic-hematite." It has, as a rule, the characteristic cherry red streak and dark grey color of hematite, but in spots and in the vicinity of jasper intrusions is altered to a black ore which is magnetite. As a rule the ore is attracted by the magnet, a frequent characteristic of many grey specular ores. The magnetism, however, does not permeate all portions of the ore body, but is most frequently noted in the vicinity of the small intrusive veinlets of quartz and jasper which here and there penetrate the ore mass; in such places the ore has been convertd into a strict magnetite which gives the characteristic black streak, but remote from such intrusions the red streak of hematite is everywhere noted.

At the northern edge of this field (on the Ellis property) the only ore seen is a grey specular, which has not been exploited, but which appears to be more steeply inclined and to have a width of not over 5 or 6 feet.

The shore of the Bay of Chaleur contains a narrow strip of rocks belonging to the lower and middle Carboniferous, which is followed to the south by red and purple shales and sandstones which represent, probably, the Mill Stone Grit, as they are followed by, and include some of, the typical coarse grey sandstones of the Grit. This Carboniferous system extends along the eastern bank of the Nipisiguit river for 13 or 14 miles, but the western bank shows only the old granites and gneisses of Laurentian Age for the same distance. The inclination of the Carboniferous is very slight, the average running from 3 to 4 degrees from the horizontal. Above, or to the south of, the Laurentian and lying directly upon the granite are reddish and grey schists and slates, shading into blue or black slates which, in places, are highly disturbed and occasionally cut by quartz veins which render the schists more quartzose and less feldspathic. Frequently the black slates are ferruginous with pyrites, and in places the silicification has formed hard green quartzites whose color is doubtless due to a mixture of chlorite.

It is in this series of altered schists and slates that the iron beds occur. Twenty-eight years ago these schists and slates were provisionally regarded as "Cambro-Silurian" or portions of them as "Pre-Cambrian." Although unaltered eruptives were not noticed in the field the microscopic examination of the hanging and foot wall country indicate their presence in the vicinity.

Geological exploration of the region is exceedingly difficult owing to the dense growth of timber which covers it, and to the frequent patches of thick moss which cover the rock exposures. Undoubtedly a field party will be put into this new district during the coming summer in an endeavor to more clearly define the probable limits of the field, and to make a correct section, if possible, of the rock series in which the ore occurs.

Geography and topography.—The property lies about 21 miles from the town of Bathurst in a southwesterly direction, and on the north bank of the Nipisiguit river. The country rises quite rapidly in this distance, so that the elevation of the beds is about 450 to 500 feet above the sea level. Going southwest the country rises steadily until the hills of this section are reached, which vary in height from 800 to 1,500 feet above the sea level. The general character of the country is hilly and broken, with stretches of level lands along the main river. The general direction of the slight elevations which give a rolling character to the country is northwest and southeast, and across these ridges, with a general strike of nort northeast, run the bands of the formation which carry the iron ore, and which in consequence are sometimes exposed along the crests of the ridges.

Discovery.—The first discovery of ore in this field dates back to the year 1902, when Mr. William Hussey, of Bathurst, in attending some traps which had been set on Austen Brook (a tributary of the Nipisiguit River) hurt his foot upon a rock beneath the snow which turned out to be a piece of float ore from the crest of the hill nearby. The heavy character of this small boulder puzzled Mr. Hussey, who knocked off a piece and took it home with him, where it was shown to one or two people, and, by the kindness of Mr. T. M. Burns, was taken to Fredericton for examination by a Provincial Government official there, who at once pronounced it to be iron ore of a fairly good quality.

The previous history of iron ore deposits in New Brunswick had not been such as to make their mining particularly attractive as a venture, and it is not therefore surprising to find that little interest was shown in the matter. I am informed that a representative of the Dominion Iron and Steel Corporation visited the locality a few years ago, but saw only the scattered and comparatively small outcrops in the area which is now designated as "No. II." I am also informed that this

gentleman entertained a favorable opinion from the small surface exposures he was then able to see. But, in the winter of 1905, when in the same locality, Mr. Hussey remembered his previous mishap and and made a short but more thorough examination of the region, with the result that he found other outcrops and an abundance of fragments or boulders of ore on the southern bank of Austen Brook. This convinced Mr. Hussey and Mr. Burns that the ore was distributed over a quite extensive area, and these gentlemen secured rights to search upon several five-mile locations in this district.

Through the assistance of friends, advice was received from Dr. Eugene Haanel, the Dominion Superintendent of Mines, and under his authority Mr. Einar Lindemann made a survey of a portion of the field with the magnetometer, in whose use Mr. Lindemann was skilled. The Government of New Brunswick were also petitioned (under statutory regulations) for the use of the diamond drill belonging to the Province, which was granted, and the first hole was finished about the beginning of December, 1906, by which time Mr. Lindemann had completed his magnetometric survey and filed his report. Mr. Lindemann's opinion, as expressed in his report, was favorable to the existence of large bodies of ore, but could not, of course, indicate the purity or otherwise of such ore. For this reason the then owners decided to continue the work of drilling the field and obtaining analyses of the ore found in the cores.

(To be continued.)

BOOK REVIEWS.

A Text-book of Assaying, by C. and J. J. Beringer. 11th edition. Revised by J. J. Beringer. Crown 8 vo. Cloth, 10s. 6d. Charles Griffin & Co., London.

Is not the appreciation of high standards our higher education, and is it not to the Old World that we look for our standards? This book is one of the standards. It is one of that most excellent series of metallurgical books edited by the late Roberts-Austen. Published in 1889, it has now reached its 11th edition. One of its authors was at one time chief assayer to the Rio Tinto Copper Company. Its 11th edition has been revised by the Principal of the Camborne Mining School, a school that boasts, and rightly, of being one of the most practical mining schools in the world. Not only is it in the heart of a mining district but it owns a mine that is worked by the students. And because it is in an old district in which there are few openings for mining engineers these students are trained not specially in tin mining but for work all over the world.

This book certainly should be one of our high standards, not alone in assaying, but a standard for all technical works; it should be a standard in technical teaching; a guide not alone for students but for professors.

It contains 450 pages, sparsely illustrated, showing in its remarkable freedom from errors great care in its production. It has a fairly good index and an elaborate table of contents. The book is divided mainly into three parts, of which the first, covering only 86 pages, deals generally with methods, apparatus and reagents and more specifically with chemical equations and the determination of specific quantities. Part II. deals with the metals and alkali earths and covers 258 pages. Part III. deals with the non-metals in 90 pages, of which only two are given to coal. In all, the determination of 56 elements, besides cyanogen and ammonium, is outlined with greater or less elaborateness, and eight pages are devoted to the examination of water, including the determination of albuminoid ammonia. This sounds more like an encyclopedia than a text-book. In fact, it is somewhat of both. Gold, silver, and tin are dealt with fully. In copper and lead the treatment is not so complete. Iron from the ordinary assayer's point of view, not the iron specialist's, is fairly well taken care of, as are also manganese and sulphur. The rest of the determinations are touched on chiefly in outline.

All this is excellent; the general plan is good, but when we come to the details, alongside much that is good we find much of which to complain. As a rule the descriptions are clear, the effort is made to show each step distinctly, and the writers have generally in view an ignorant and untrained students; but the writing is often rambling and repeats itself, and does not leave the clear, succinct impression that is essential for laboratory work.

Proper weight is not given to methods and statements; several methods being given to accomplish the same end without any statement as to which is the best or sufficient explanation as to when one may be better than another. For example, the subject of the parting of gold and silver is dealt with in detail, eight pages geing devoted to it. The three methods of proceedure of parting in flashes, parting in test tubes, and parting in glazed crucibles, are given equal emphasis. From an academic point of view they are all three equally interesting; but from a commercial point of view, when one is working against time, they are not in the same class. This consideration is not even hinted at. Again, despite the eight pages of details of parting, we have to go back several pages to learn that it is not necessary to flatten out the bead before parting, that it may be done in the round form if sufficient silver is present, and nowhere are we told that if sufficiently dilute acid is used and the operation allowed to proceed slowly a coherent gold skeleton may result. This is a very simple point, but is sufficient to make or break the possibility of getting out the day's results.

This diffusing or scattering of the information occurs in other places, for example, in dealing with cupels. In Chapter II. on Methods of Assaying, in the description of apparatus there are a few lines on the making of cupels. In Chapter IX. under the heading of Gold there is some more information on the making of cupels. But in the whole book there is not enough information to teach a man how to make a satisfactory cupel. There is nothing about the desirable qualities of the bone ash or its necessary coarseness or fineness. There is not a word about the many cupel making machines in use at the present day, nor a hint at possible substitutes, such as Portland cement, that so many use with complete satisfaction. There are seventeen pages altogether on cupellation, and except for the lack of succinctness, they deal fairly thoroughly with the sub-

ject. The academic side is well handled, the practical or the commercial side does not seem to have occurred to the authors. And yet in other parts of the book detailed instructions are not lacking. We are told that coke furnaces should be started with wood, as the coke is hard to ignite. We are even told that when preparing samples "one ore should be done at a time." But these are minor details, only of importance as they shed light on the general trend of mind or method of the teachers.

On the all-important question of the choice of methods of proceedure the book is safe and solid. Except in the one case of tin it makes no effort to be up-to-date; it stands by the old reliable methods, and sometimes one is almost tempted to call it Archaic. One fails to find any attempt at quick methods or shortcuts. In fact, accuracy, and accuracy only, seems to be the qualification sought after. Time and simplicity of operation are so unimportant that one fails to find even a hint concerning them. The preliminary roasting of ores, sometimes in roasting dishes, sometimes in crucibles buried in coke (!) is recommended, and only once are nails referred to. It is true, it is sometimes recommended to use a bar of iron with sulphide ores, but we who never roast (or hardly ever), and to whom nails are as common in the assay office as crucibles, cannot help wondering at these methods.

There are, however, two good things in the way of methods. The authors condemn the pot or dry assay for lead. They say "it is only applicable to rich ores and with these only gives approximate results." They also damn the cyanide method for copper. This is good. They also in a great many cases show the effect on the accuracy of results of changes in the conditions of proceedure. This is often in the form of series of actual results. This is most excellent; it is the best point in the book, and one to which we would draw especial attention.

But though we have spoken well of their methods of determination, it must not be considered that even here their standards are such as we should look up to as high. They devote nearly six pages to the dry assay for copper. To the historian this method may be of interest, but why teach it to modern students? They say the electrolytic "is the most satisfactory method for copper," and they give eight pages to it, in which they describe old-fashioned apparatus, recommending the use of two cells of the old type Danniel battery, the porous pot of which "must be emptied out and recharged daily." They allow the current to act for sixteen hours and then say: "It still remains to determine any copper left undeposited in the solution," and they proceed to estimate this colorimetrically!

Now the electrolytic method for copper is not only the most useful that we have, but it is second to no other assay in accuracy of results, and it is less dependent on the skill of the assayer than any other assay. On the other hand, the colorimetric method depends entirely on the judgment of the assayer, and at best is only an approximation. To complete the electrolytic by the colorimetric is like doing most of a survey with a transit reading to minutes, and then finishing up with a prismatic compass; or perhaps a better simile would be to say that it was like making a journey in most part by automobile and then finishing up by walking the last few miles on foot. This may be all right and pleasant if one is an amateur and time is no object, but we learn assaying to earn money by it and we must get results. The electric current can be used to leave no measurable trace of copper in the solution, and even 10 years ago it did not take sixteen hours to do this. Nowadays it does not take four, and even on the weakest solutions the electrolytic method is much more accurate than the colorimetric.

However, as we have said before, the authors make not effort to be anywhere nearly up-to-date, except in the case of tin. In assaying cyanide solutions for gold they evaporate to dryness in a lead dish and make no mention of the zinc and lead acetate method. They always precipitate copper with sulphuretted hydrogen and make no hint of the possibilities of using aluminium. And their sulphuretted hydrogen they make in an ordinary bottle (upon which they waste one of their very few illustrations), that goes on making gas uninterruptedly till all the material is consumed!

Upon the whole question of apparatus they are very weak. They only mention two types of furnace, the wind furnace and the muffle furnace, both using coke. They illustrate these with the ash pit scorching the legs of the assayer. They mention no other fuel but coke, say nothing of gasoline furnaces, and never think of putting a crucible in a muffle, always using it in a bed of coke. They say that the fused material may be left in the crucible and "separated from it by breaking when cold." Also "wrought iron crucibles are very useful for making galena assays." And these statements, which appear to us foolish, carry as much emphasis in their book as their most valuable ones.

The whole subject of sieves is dismissed in three lines, and practically nothing is said about the degree of fineness to which a sample should be crushed, until they get to Appendix C, where there is a disappointing lecture on the theory of sampling. The only crushing appliance they mention is a "bruising-plate" which looks like our buck-board. It is used with a "bruising-hammer," which has a face four inches square! Not a word is said about any of the crushing or grinding machinery, which is so necessary to us. There is not even a word about the riffle-samplers of the Jones or other types, which we consider essential. They impress the importance of thorough mixing, but they give not one word as to how it may be done beyond laboriously forming the material into a cone. In fact, all the way through the book no evidence is given of the slightest appreciation of the value of time. Very little is said about balances, nothing about their care. It is not even mentioned that more than one kind may be required in an assay office. In fact the only specification in regard to balances is the unqualified statement that "a fairly good balance should be sensitive to 0.0001 gram." Of course everyday gold balances are sensitive to one-tenth of this.

But enough! Evidently this book, despite all pretentious environment of its birth, is not a standard, at least not a standard for us. What is the matter? It has several faults, but from the broadest view it has two main faults. It shows no sign of progress in the art. With the one exception of the chapter on tin, this book might have been written almost entirely 20 years ago. The second fault is that it is academic and not commercial. What is the cause of these faults? There are probably many causes, and we are not in a position to define them, but, with all deference, we must remember that the book was produced in Cornwall. Now the sum total of progress in mining in Cornwall divided by the number of years they have been mining there is less

than in most other spots on the globe. The Phoenicians mined in Cornwall. This must needs have its effect. Though this may be a reason, it should not be allowed as an excuse.

We have before us several medical books no more pretentious than this, and they all breathe the spirit of progress in every page. One in particular on miscroscopical work, which is comparable with our assaying, gives its best efforts to illustrating time-saving and effort-saving methods. The latest mechanical devices and the latest stains whose greatest claims lie in their ability to do more and better work in a given time are given precedence over everything else. Surely medicine is not less academic than mining.

This book is not a high standard—for us it is no standard at all. A student trained only in this book would not be able to carry on successfully even a small commercial assay office in this country, and unless he had a very kind chief could not rightly fill the position of assistant in a large one. It is a useful book for reference, there is much to be learned from it, but it is of a type of which the weak points must be recognized by both our students and our teachers.

H. E. T. HAULTAIN.

EXCHANGES.

Mining and Scientific Press, June 6, 1908.—The fourth of Mr. T. A. Rickard's articles on Goldfield appears in this number. Its subtitle is "Rich Ore and Its Moral Effects." The article is an instruction summary of "high grading" in a country where that nefarious art was carried to a high pitch of perfection. We shall transcribe a few paragraphs from the paper:

"Rich ore invites theft. Wherever men find minerals so valuable that a small weight of it represents money, there the temptation to steal is inevitable, the weakguard of conventional morality is broken, and the conscience of the miner is debanched . . . . 'High-grading' is larceny."

The peculiar labor conditions gave the labor union a dangerous control of the stock market. "Mining operations were condutced under leasehold; the owners of the mines were, for the most part, without experience of mining; they had no capital, and they did not know where to look for ore; so they granted leases to parties of working miners willing to work, and to adventurous operators willing to furnish the money for exploration."

"The ore was rich indeed. In the Francis Mohawk lease at a depth of 200 feet, there was eight inches of stuff that assayed $250,000 per ton; it was free gold and calaverite or telluride of gold. The various leases on the Mohawk mine yielded a total of $50,000 per day for 106 consecutive days. One carload shipped to the Selby smelter weighed 47 tons, and assayed 609 ounces of gold per ton, so that the shipment was worth $591,637, that is, more than $6 per pound. There were many places in the mines where men knew thy were breaking ore worth 10 to 15 dollars per pound. It was easy to steal several pounds of ore. And they did . . . It is estimated that last summer over $1,000,000 worth of ore of which no proper account was made went out from the Mohawk and Combination mines, and $500,000 to $750,000 from the Florence. Not less than $1,000 per day of illicit bullion passed trhougn the United States mint at Carson . . . . Only $300,000 was recovered last year from the whole camp, despite every effort to find the stolen ore. It is most difficult to trace the 'high grade,' for the thieves crush it at once and so destroy the chance to identify the poduct from any particular mine. Unless identified positively, the legal evidence is incomplete. The stolen ore is usually taken to a bogus assay office, the proprietor of which pays about 50 per cent. of its real worth. The ore is treated by chlorination . . . . In one case a plant was raided while in operation. The heading assayed 260 ounces gold per ton; the tailing assayed 15 ounces. Larceny does not wait on accurate metallurgical method."

The owner of the establishment said that "this residue would be sold to a man who intended to salt the oxidized ore on a neighboring claim. Even when the circumstantial evidence seems convincing, the local justices are afraid to convict; public opinion regards 'high grading' as rather humurous, the labor unions preach a doctrine by virtue of which a little rich ore is the miner's perquisite, the rush to become wealthy possesses everyone, and in the excitement the moral law is left high and dry."

"Regular harnesses were invented for carrying ore under the working clothes of the miners. They would step from the cage or bucket and stumble heavily laden on their way homeward without being arrested, although the officials knew why they walked so clumsily." Picturesque incidents are cited, especially of the connivance of the labor union. "And thus we come to the root of it all; the subservience of the lessees to the labor union. Why? Because the ore was rich, and the terms of the leases were short, the lessees could not afford to delay the extraction of ore by having trouble with the men; the men knew it, and so stole as much as they could . . . . The rights of property were not respected because the judges who preside over the local courts owed their position to political election."

But stealing was not confined to the miners. Stories are told of others, among them one of a mining company president who filled his suit case with specimen ore each time he visited the mine. His stealings in one year amounted to $22,000.

"During the strike that was ended in April, 1907, the stock market was worked by the labor union leaders. They would call a meeting under pretext of settling the strike, and the announcement of this fact would lead to the buying of shares by the general public; they would sell short, and then cover their shorts by open purchases made through their wives; this stimulated more buying; then the counting of votes cast at the meeting of the union would be dragged along so as to afford the time necessary to complete the stock transactions. Thus they see-sawed the market five or six times. This broke the brokers, who had been breaking the public. It was a merciless game of depredation. . . . There was not much to choose between them all; it was a case of catch as catch can, with the odds in favor of the one who first placed his hands on the ore—the miner himself."

The Mining World, June 20, 1908.—Henry A. Mather writes in this number of the mining and metallurgical industry in Georgia. The hydraulic gold of Georgia is generally so flaky that more than 50 per cent. escapes the riffles. When the sandy quartz veins are stamped and amalgamated less than 50 per cent. is saved. The mines generally credit the hydraulic dirt with $3 to the yard, though some of it showed over $100.

The deepest shaft in Georgia is 160 feet and the total gold extraction from 1825 to date is about $10,000,000, of which 80 per cent. has been obtained from hydraulic operations. No dredge has yet been operated in the country although dredging would probably be profitable.

Mining property is difficult to purchase at a fair valuation. Some of the older miners use blanket boxes as auxiliaries, to the rifles and there are reports of savings of over $60 per yard from the finer vegetable mold which necessarily churns up into silt and escapes the riffles.

The Colliery Guardian, June 12, 1908.—The Norton Hill Colliery accident is commented upon in the recent number of the Colliery Guardian. The investigation following the explosion brought out much conflicting evidence. The question as to whether the explosion was due to coaldust, to firedamp, or to both of these agencies, could hardly be settled. There is yet much difference of opinion amongst investigators. But "the official view that because some kinds of coaldust may produce an explosion, therefore all coaldust is to be regarded as dangerous, and precautions are to be taken accordingly, is without doubt the safest; but until there is more unanimity upon the coaldust theory, these precautions will not be taken in all cases, especially while any discretion is left to the management as to what is to be considered a dry and dusty mine."

PERSONAL AND GENERAL.

Mr. W. K. McNeil, manager of the Canadian Laboratories, Toronto, was united in marriage on June 17, to Miss Welsh of Markham, Ont.

Mr. J. J. Harpell, business manager of the "Canadian Mining Journal," is visiting Great Britain on business. He will be absent throughout July.

Mr. J. F. Black of Sudbury, Ont., visited Toronto on June 12. Mr. Black is the original discoverer of the Moose Mountain iron ore deposits.

Mr. S. Cohen, manager of the Crown Reserve mine, Cobalt, Ont., was injured recently in a runaway accident. Mr. Cohen's right shoulder was broken.

Mr. H. H. Sutherland, late of Haileybury, has returned from Rawhide. Since last February Mr. Sutherland has been working in that new camp. He has now secured an advantageous lease on a claim and is opening the property at a rapid rate.

Mr. W. Fleet Robertson, the provincial mineralogist of British Columbia, is exploring the Finlay River district. He will be absent two and a half or three months. He will examine the extent and value of the reported discoveries of placer gold at and around McConnel creek. On both trips Mr. Robertson will, by means of wide detours, explore the country. He will report upon the desirability and probable location of roads.

CORRESPONDENCE.

To the Editor,
"Canadian Mining Journal."

Dear Sir:—In your issue of June 1st, Mr. F. Hille makes some criticisms of two papers read by me before the Canadian Mining Institute, to which I desire to make a brief reply. Criticisms of such papers are welcomed by the Institute and by the writers, and if more written ones were made the Institute's Journal would gain in value. Such criticisms should, however, be of the facts given, or of the inferences drawn, and here Mr. Hille lamentably fails. To shorten this note I will not reply to his criticism of my paper on "The Iron Ores of Ontario," leaving that to Professor Leith, who is charged with the same error as myself.

As to my paper on "The Origin of Deposits of Pyrites" (Jour. Can. Min. Inst. X, 118-123, and Can. Min. Jour. Nov., 1907), Mr. Hille has done me the doubtful honor of reading it so carelessly as to be unacquainted with its contents. For instance, he says: "He attributes the origin of a large number of the pyrites deposits to sedimentation, and refers for support to Beck, Kemp and others." On the contrary, Beck and Kemp give no support whatever to my thesis, and I cited their two recent books on Ore Deposits to show current opinion on the topic.

Again Mr. Hille writes, "I fail to find any explanation as to what kind of sedimentation he ascribes their occurrence." Let me call his attention to the following quotations. "The third theory (sedimentary beds) assumes the precipitation of iron sulphide from solution as a bed at the bottom of shallow water. Other chemical and mechanical sediments occur above and below such beds." (page 1 pamphlet edition). "The pyrites in the iron ranges can be satisfactorily accounted for as a chemical precipitate" page 10. "We conclude, then, that for a number of our Ontario pyrites beds the origin has been one of chemical sedimentation" page 11, and further on pages 8, 9, and 10 details are given of how sedimentation was effected.

Again Mr. Hille says that I attribute to the pyrites deposits near Schreiber a sedimentary origin. On the contrary I wrote, "Near Schreiber. . . . . is a deposit of a different character," and specifically mentioned that "the ore is associated with an eruptive diabase, and is considerable mixed with pyrrhotite carrying small amounts of nickel and copper."

I can only acount for these mistakes by a very casual reading of my paper. There are other mistakes in his letter of a different class.

For example, Mr. Hille writes:

"There is no doubt that the Helen ore is to a large extent an oxidation product, from pyrites and siderite, but these minerals are not of the same age as the Animikie rocks, as has been repeatedly asserted, but date from the time of the greenstone eruptions, which occurred after the Animikie had been laid down."

I know of no competent geologists who asserts that these minerals are of the same age as the Animikie rocks. On the contrary such men as Van Hise, Leith, Coleman, Merriam and others agree in considering the pyrites and siderite of Keewatin age. Mr. Hille alone asserts that they are of post-Animikie age and we may reasonably ask for some proof of this amazing statement. I may note in passing that pebbles of pyrites and siderite from the Helen formation occur in the Lower Huronian conglomerate which much antedates the post-Animikie eruptive greenstones.

With Mr. Hille's suggestion that the "pond like places or rounded depressions are the collars and vents of craters, vents of geysers, or fumaroles" I have no sympathy. The pond at the Helen mine is undoubtedly due to solution (see paper by Coleman in Geol. Soc. Am.). At Goudreau Lake numerous examples are found of hollows from a few feet in diameter to several hundred. That they are due to solution has been admitted by all who have seen them.

Apparently Mr. Hille believes that the iron pyrites beds of Ontario are due to expiring vulcanism. If so, will he please explain why all these volcanic deposits happen to be associated with the Keewatin iron sediments? The Michipicoten pyrites for instance, he associates with post-Animikie greenstone. Why did these eruptions all occur for 60 miles along a narrow band of Keewatin iron sediments at most under 1,200 feet wide, and never in the Keewatin schists, or in the lower Huronian conglomerates and slates, or in the Laurentian granites which border this strip? How does he account for the microscopical character of these pyritous cherts which seem to all observers to be chemical sediments? Has he any evidence to offer that the pyrites was deposits in the siliceous and sideritic beds subsequently to their deposition as sediments? Criticism of this character would be valuable.

Yours truly,

A. B. WILLMOTT.

INDUSTRIAL SECTION.

The Manufacture of Grinding Wheels and Other Abrasive Products.—Before the invention of the electric furnace artificial abrasives suitable for grinding wheels were unknown. Wheel manufacturers necessarily depended upon natural products, chiefly corundum and emery. As emery occurs in considerable quantities in various parts of the world, it came to be recognized and used as the chief raw material for grinding wheels and other products employed in grinding metals. On this account the modern grinding wheel made of any abrasive is popularly known as the "emery wheel."

The Norton Company has during the past few years been operating an electric furnace plant at Niagara Falls, in which has been developed and brought out an abrasive known as alundum, which possesses the characteristics of sharpness, uniformity and right temper.

The introduction of alundum in the field of grinding has been remarkably successful and rapid. The requisites sought for and attained in this abrasive are extreme hardness and sharpness, combined with uniformity and proper temper. These qualities in alundum have had much to do with its successful development.

The process of making alundum consists in taking the purest amorphous oxide of aluminium found in nature, bauxite, purifying and melting it in immense electric furnaces, the power for which is furnished by the Falls of Niagara. Upon cooling, this molten mass solidifies in solid ingots of alundum. Beautiful crystals are found in the centre of these masses, showing nearly all the variety of colors found in the ruby and sapphire, of which alundum is one variety. The rarer col-

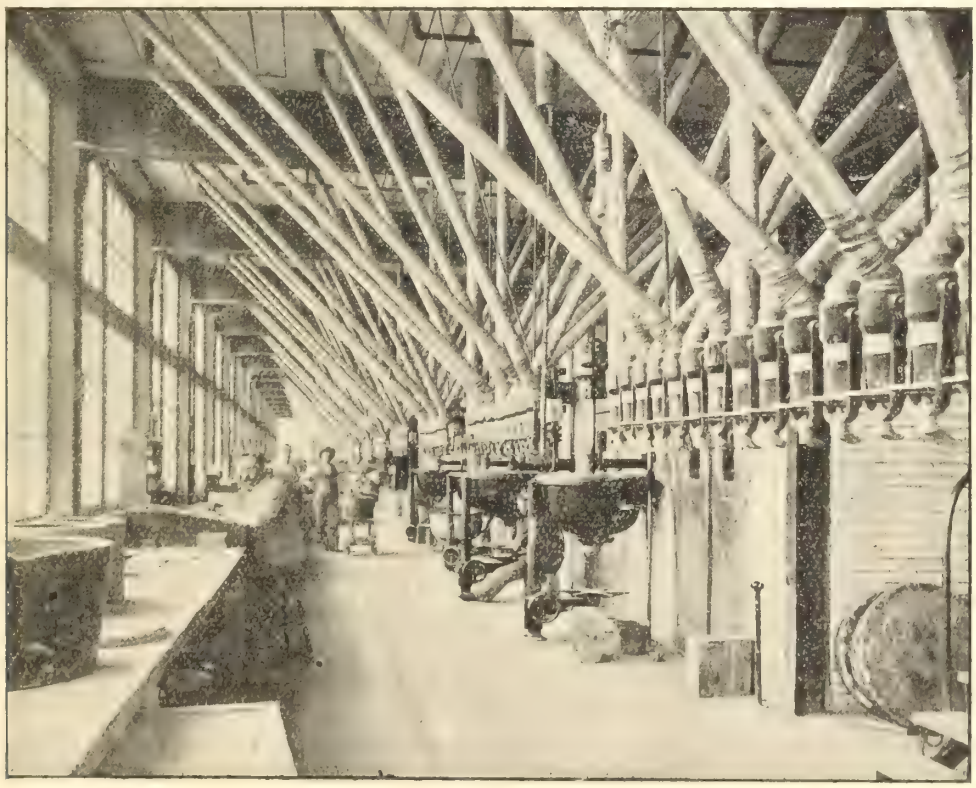


FIG. 3

ors of light pink, blue and purple found in Oriental gems are sometimes noticed in small crystals.

Bauxite is the purest naturally-occurring amorphous oxide of aluminium known. This mineral was originally found at Baux, France, from which it derives its name, but purer forms are now obtainable on this continent. The best quality only is used in the manufacture of alundum, and in its preparation practically all impurities are removed. The high grades of bauxite used are of rare occurrence. The Norton Company, however, owns its own mines from which the purest grade is obtained.

The bauxite is heated in calciners to drive off the combined water, and is then melted directly in electric furnaces of special design. It was not practical to fuse bauxite commercially until the invention of this process. The temperature in these furnaces probably ranges from 5,000 degrees to 6,000 degrees Fahrenheit.

The operation of these furnaces and the composition of the molten bath is under the control of the furnace operative. Exact quality and uniformity, which are so important in steel manufacture, are fully as important in the manufacture of alundum. The highest grades of steel are now being made in electric furnaces because impurities can be removed at the high temperatures obtained by the electric arc, and the quality of the molten bath uniformly maintained. In the alundum furnace both the purity and uniformity of the alundum are assured. Each step in the process is under the close supervision of expert chemists, who are constantly directing and following the work by careful analyses in the Norton Company's chemical laboratory.

After the ingots of alundum have cooled they are broken up and the pieces are then reduced to smaller pieces by means of powerful crushers. After this reduction the material is still further reduced by being passed through smaller crushers and several sets of grains, which are required in the manufacture of grinding wheels. After passing through rolls, it is subjected to the usual washing and drying processes to prepare it for manufacture into grinding wheels, rubbing and sharpening stones and other articles.

The solid massive alundum, while resembling the purest natural corundum in chemical composition, has the remarkable quality of being considerably harder than the natural product. This is due to the perfectly fluid condition in which the mass is brought, the control of its composition, the rate and method of its cooling and solidifying by which it receives its temper, and the absence of water of combination.

The necessary requisites for the most efficient abrasive for grinding wheels are: 1st, sharpness; 2nd, hardness; 3rd, right temper; 4th, uniformity.

In order to insure rapid and continued cutting so far as sharpness is concerned, a peculiar quality is necessary. There must be a fracture which will give a number of sharp cutting points.

In the matter of hardness the recognized standard is the diamond, which is the No. 10 in the scale of hardness; nothing that man has yet discovered or made equals the diamond in hardness. The term "hardness" is, therefore, a comparative term, the hardness of a mineral being ascertained by its ability to scratch another mineral of a known degree of hardness, or to be scratched by such a mineral.

Pure crystalline corundum, represented by the best sapphire or ruby, has always been the standard for No. 9 in the scale of hardness. This is readily scratched by alundum; in fact, alundum powder is used for cutting and drilling rubies and sapphires for watch jewels, etc.

By "temper" is meant its strength of grain and the character of its fracture under grinding pressures. An alundum grain is remarkably tough and will stand more crushing pressure before breaking than any other abrasive grain, but when it does break it breaks with a sharp crisp fracture, giving a fresh, keen cutting edge. This is a most important quality in an abrasive.

Purity, besides resulting in greater hardness and better temper, is necessary in the bonding of the grain into wheels in order to secure accurate and uniform results. Uniformity is necessary to secure constant efficiency of grade and temper in a wheel, so that wheels can be accurately duplicated at any time and maintain their standard of work.

Uniformity is one of the most important requisites in an abrasive. The ability to duplicate grinding wheels is essential to obtain the best results. In grinding wheels the abrasive grain of a given size is bonded together to produce a certain grade or temper for a certain kind of work. The term grade, as applied to wheels to designate the degree of hardness, is the resistance of the particles to the pressure employed in the act of grinding. A wheel from which the particles are easily broken is called soft, while one which retains its particles longer is called hard. Wheels are graded from soft to hard, depending upon the class of work on which they are used. Different grades of wheels are obtained, according to the amount of bond employed, the wheel becoming harder as the amount of bond used increases.

Different grades are required for different materials to be ground; cast iron, steel, brass, glass, bone, leather, wood and other substances demand wheels of special grade, which must be duplicated to make the grinding operation continuously efficient.

Then a record of each wheel is entered on a prepared form, with description on wheel, number of revolutions, order number, and for whom the wheel is intended. This record is signed and sworn to by the tester of the wheels each day before a Justice of the Peace, and carefully filed by the Norton Company. A record is preserved of each order, so that it can be duplicated exactly as to composition, cutting quality, shape and size.

Very few people realize the many uses for which grinding wheels are employed. They are used in the machine shop for sharpening all kinds of tools, cutters, reamers, taps, dies, etc. In the foundry for grinding castings. The sawyer gums and files his saws with an alundum wheel with no danger from drawing the temper of the tool. The leather manufacturer finishes the leather for suede gloves on a grinding wheel. The manufacturing optician grinds the edges of lenses for eye glasses. In the great glass works beading, fluting, edge grinding of tumblers, checkering fine stars, and fine work of all character calls for grinding wheels and abrasive stones.

The Canadian Fairbanks Company, Limited, are the selling agents for Norton grinding wheels, and stones and carry large stocks in their several warehouses at Montreal, Toronto, St. John, Winnipeg, Calgary and Vancouver. Catalogues and booklets describing the manufacturing of alundum into grinding wheels will be mailed to any address on application.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The management of the Nova Scotia Steel & Coal Company have not appointed their representative on the Board of Conciliation which was applied for by the P. W. A. upon this company's refusal of the men's demands for an increase in wages. The Nova Scotia Steel & Coal Company say they cannot afford to grant any increase in wages in the present state of the market, and their action in closing down their Sydney Mines steel plant should speak for itself, when considered in connection with the passing of the Scotia dividend. The fact of the matter is that the present state of the coal and iron market tends rather to a reduction in wages than any increases, and it was only the peculiar territorial conditions that attend the operations of the Dominion Coal Company that enabled that company to grant the increase they recently consented to under the Board of Conciliation held in March. It is evident that the Sydney Mines company cannot grant any advance in wages, and whether the leaders of the P. W. A. will have the courage to accept the inevitable, in the face of what will be urged against any such action by the fiery spirits who want to fight, remains to be seen. The fact of the matter is that the labor market is a shade too easy to warrant a strike in Cape Breton.

Mr. Graham Fraser's residence at North Sydney has been turned into what is now the Harbor View Hospital. The funds for the work of this much needed institution have been raised by the workmen of the Nova Scotia Steel & Coal Company, assisted by the company, and by a general public subscription at Sydney Mines. Everybody knows the crying need for proper hospital accomodation in colliery and steel towns, and the citizens and workmen of Sydney Mines are to be congratulated on their successful efforts in this direction.

The long agitated question of whether the P. W. A. shall amalgamate with the U. M. W. A. is to be decided by a general vote of all the members of the P. W. A. to be taken on the 24th of June and may the best men win. Like Josh Billings, we prefer to prophesy after the event.

So far the outputs of the Dominion Coal Company for the month of June have been remarkably good. To the 15th they aggregate 185,000 tons, and if all continues to go well the month of June, 1908, will be in every respect a record one. Indeed records are flying all over just now. All the mines from No. 1 to No. 12 are on the producing list, and new and old keeping up a steady average. In previous years June has shared with October the production of large outputs. The three summer months between are, however, fraught with uncertainty, it being the holiday and picnic season. Picnics are an institution dear to the heart of the Cape Bretonian, but they do not interfere dreadfully with outputs. We have often though it would be better if men would take their vacation in such a way as not to utterly disorganize everything at one time. It is a scheme that has worked well elsewhere. Every man is entitled to his yearly vacation, but one can understand the language of a colliery manager when his outputs go down and his costs go up, coincident with a picnic. Still, it is pleasant out o' doors in Cape Breton when the wild rose blooms.

One of the Halifax papers contained an article borrowed from English sources, having reference to the influence of a legislative Eight Hour day on the price of coal in that country, which classes as fallacious all arguments forecasting an increase in the price of coal following the enactment of an Eight Hour day, and proceeds as follows: "Poor men ask why they who work much longer than the miners, and receive far less than the miners, should pay more for a common necessity of life in order that the hours of a body of workmen much more fortunately placed should be still further reduced." This sentence is a gem of truth in the midst of a matrix of error, for the article goes on to insinuate that these same workingmen are being designedly stirred up against their fellows by the bogey of dear coal. But leaving this aside, we consider the question asked is a very natural one, and a question moreover that many, very many, British workingmen are asking themselves to-day. In conversing with an English emigrant recently the writer was told that the "British Workingman"—that favored person whose glorious possibilities and privileges are daily held up for the fatuous admiration of credulous workmen in this part of the Empire—was walking the streets of Sheffield, Manchester and other large manufacturing centres of England, thousands upon thousands of him, looking for work, asking nothing but work. This man expressed himself as being deeply grateful for the chance that had enabled him to leave his favored homeland to find a less favored spot where he could nevertheless find work and bread. He was a British workingman himself, but he expressed his views on radical legislation in terms that occasioned us some surprise, and led one to ask whether there were not many British workingmen who were thinking along similar lines, and whether the day was for distant when there would be a distinct revulsion against the present craze for class legislation gone mad.

Kipling, in one of his "Letters to the Family" properly arraigns the soi-disant British workingman in the following unvarnished way: "Englands' weakness is an excess of voters who propose to live at the expense of the State. They pride themselves an being an avowed and organized enemy of the Empire, which as others see it, waits only to give them health, prosperity and power beyond anything their votes could win them in England." The fact is the true spirit of labor, the spirit that has made England and her family over the seas, still survives in England, and the blatant demagogue who preaches political economy according to his lights over the beery table of the alehouse, is not the British workingman. There are, to quote Kipling again, "millions of silent careful folk accustomed even yet to provide for their own offspring, to bring them up in the resolute fear of God, and to desire no more than the reward of their own labors. . . . It is one of their preoccupations to send their children to Sunday school by roundabout roads, lest they should pick up abominable blasphemies." And Kipling sums up the matter thus: "Meantime the only serious enemy to the Empire, within and without, is that very Democracy which depends on the Empire for its proper comfort, and in whose behalf these things are urged."

We have digressed from the main point at issue. Our writer states that the price of coal will not be increased by an Eight Hours Act, and he goes even further than this, in the following remarkable statement: "It would be possible to produce and distribute coal at a much lower price than that now ruling, though the workers labored for even less than eight hours, and though the wages were even higher than the trades union standard." After stating that there will be no increase in the price of coal, he states that any increase which may after all take place is explained by the fact that the coal owners "might artificially raise the price of coal to direct public opinion against the Eight Hours Bill." We find it hard to see why the coal owner, who has to pay a higher wage for a less labor return, should need to resort to artificial methods of raising the price of coal. His cost sheets will go up quite naturally, and we think the only thing artificial will be the dividends. At the risk of being thought unprogressive we still think the capitalist is entitled to some return.

The article goes on to prove how small is the share of the miner in the price obtained for the coal, and gives the following figures, which may be taken as correct:

Cost of production per ton, including wages.....	5s.	6d.
Railway rates..	7s.	0d.
Cost of distribution to the consumer in London....	2s.	0d.
Wagon hire (car hire)	1s.	0d.
Contingencies....	1s.	0d.

We quote the comment: "From these figures it will be clear that the miners' wages are an almost negligible item in the cost of coal, and that if the swollen profits of the various grades of parasites could be eliminated coal would be sold at a much lower price." We wonder how much would satisfy the miner? We have hear this same kind of argument (?) put even more crudely than by the present exponent. Miners' leaders have been known to argue that if a miner received say 50 cents for his mining, and coal sold at $2.50, the difference between these two amounts was the profit of the coal owner. There does not seem to be much more in the argument above.

What then is the wonderful remedy for a state of affairs so disastrous to the poor miner? Nothing novel, but the same old gags, state owned mines is one panacea, another is mines owned and operated by co-operative societies. We are sagely informed that a combination of coal consumers would be able to "bid defiance to the mine owner, the railway magnate, the middleman, and all other exploiters who are at present busily engaged in playing off their victims one against another." Really! We once knew a co-operative coal mine in Lancashire, England. It dropped a good many thousand pounds of good co-operative funds before it was allowed to go to a rapacious capitalist. The management of that same mine was enough to make the angels weep. Co-operation is a good thing, in its place, but its place is very distinctly not in coal mining.

We remember also a certain trades union that bought a coal mine and operated it. However, it did not work, as the workmen asked for more wages, and had they continued as they began the defence fund would have disappeared altogether. It was a miners union by the way, and what they didn't know about mining was very little, so they said. It hurts a Yorkshire miner to be asked about this mine.

Quite what relation all these views on co-operation and state ownership have to do with the price of coal as affected by the Eight Hours Bill we fail to see, although the article is headed with a large title to this effect. It is on a par with other half digested views on economics that are being daily put before our workmen.

But what are the actual facts as regards the returns obtained by English capitalists in coal mining. According to the most accurate figures that can be obtained the earnings of the coal owners in the Northumberland coalfield taken over twenty-one years averaged 5 per cent., and allowing for redemption of capital, 3 per cent. on the money invested. It will be found that 5 per cent. interest represents about all the profit that can be legitimately looked for by a coal mining concern over an extended period. Sir Christopher Furness, than whom we know of no better authority, states that out of the money expended in raising coal, exclusive of reserves for depreciation and remuneration of capital, labor receives 75.8 per cent. as its share.

The following remarks are taken from the Colliery Manager's Pocket Book, and English publication that has been issued annually for 39 years:

"If coal mines, then, with their great risks, as an investment only yield upon an average the same interest as Consols, why do persons put money into them at all? The answer of course is that it is the chance of a large profit that tempts investors. If many lose their money altogether, some few make larger profits, and each one hopes to be one of the lucky few. Moreover, it is the lucky ones that are in evidence. They are necessarily men of ability as well as fortunate, because coal mining is by no means a mere matter of chance. The successful coal owner usually goes into parliament, makes a figure there, becomes a baronet, and may even rise to the dignity of becoming the subject of a cartoon in Punch. He comes prominently before the public, and gives a fictitious importance to the advantage of coal as an investment. The unsuccessful coal owner, on the other hand, disappears from the scene, and is quite unknown to the general public."

The following figures are taken from the returns of the English Board of Trade covering the period 1886 to 1900.

Tons drawn, 2,807,395,000.
Value at pits mouth, £953,477,000.
Average value per ton, 6s. 9.65d.
Expenditure on wages, £642,386,000.
Remaining over for expenses other than wages, £311,092,000.

The amount remaining over is thus distributed by Lord Joicey, whose figures are based on accurate facts:

		Per ton.
Wages..	£642,386,000	4s. 7.01d.
Rents..	75,904,000	6.50d.
Materials, etc.	157,646,000	1s. 1.50d.
Profit....	77,542,000	6.64d.
	£953,478,000	6s. 9.65d.

Applying these figures to Nova Scotian Coal mining, what do we find? The item of rents, which in the English coal owners' balance sheet bulks as largs as his profits and oftentimes larger, is represented in Nova Scotia by the Provincial royalty on coal. The cost of transportation by rail is paid to a Government owned railway. The cost of materials represents an expenditure without which many Canadian manufacturers would be. Are all these parasites?

Another person signing himself "Aberdeen" publishes an "Open Letter to the Workingmen of Cape Breton," in which these poor benighted beings are told a few of their hitherto unrecognized miseries. We take it that this same person is an Englishman, for his writing shows a detachment and a complete failure to recognize the genius of his neighbors in Cape Breton. He says that the Town of New Aberdeen, which we are informed is as large as any in Nova Scotia, is "literally covered by houses owned by the Dominion Coal Company," and that this town is Government property, which the representatives of the people have leased to the Coal Company for all eternity! We are further informed that the real owners, that is the workingmen, are unable to get an inch of it on which to build a dwelling or to do business. Evidently this gentleman never heard of the company's standing offer to build a house for any of their workmen, giving the lot at $25, at 6 per cent. interest on the building cost, giving more liberal terms to the purchaser than are to be found in any building society anywhere. The following clause in the company's lease may explain without further comment why the Coal Company have to be so careful with their leases: "The said land and any buildings thereon shall not be used in any event for the sale of intoxicating liquors, or for any illegal or immoral purposes." We are yet further told that the company's "shacks" are rented at $12 a month. Perhaps we may explain that these "shacks" are semi-detached blocks, each standing in a large lot. There are two houses in each block, which rent for $6 per month each. Each house has two large rooms and a kitchen downstairs, and three good sized bedrooms, opening on to a central hall upstairs. When one considers that in the Town of Glace Bay rents are as high as $15 for two rooms, and that it is impossible to get a house

equal to the Coal Company's houses at less than from $15 to $20 per month, it will be seen how dreadful the Coal Company's charges are. Further, this writer says the company's store is an oppression. Perhaps this gentleman will explain why the Coal Company have voluntarily closed five of their stores in two years. He says the Coal Company supply the miners with goods "after the goods are paid for, of course." The trouble is that so many persons objected to paying for their goods.

At the end of the letter "Aberdeen" says (in capital letters) that he is elated to think he is the son of a workingman. He would have reason to be ashamed were he not. We have no room for leisured gentlemen in Nova Scotia. But is not the cult of the workingman being overdone? There is a dignity in labor, but we protest against the modern limitation of the term "workingman" to a particular class, or the gratuitous assumption that no person labors but the "horny handed son of toil," which is the way in which the soft handed agitator usually refers to the man who is working out the primeval curse. We venture to assert that the grind of modern life, the relentless wear and tear of nerve and tissue, does not fall to-day upon the workingman—so-called. There are men who labor, although their hands may be white and soft, who would gladly exchange places with the manual laborer, men whose brains crave for the "sweet sleep of the laboring man." The laboring man has a vote, but it is not upon him there is laid the stress of government, the burden of empire, the guiding of great emprise. There are men who work sixteen hours a day: work, that is, not endeavoring to give the minimum return for the maximum remuneration, but the right of these men to the title of workingman would be denied by many whose hands are horny, but whose convolutions are few.

We further question very much whether in this Canada of opportunity, this the land of true democracy, there is any virtue in being a workingman, if such virtue consists only in working with hoe or shovel for a day's wage. The Canadian should be the lord, not the helot of his hand, and very often the claim to the distinction of being a workingman is the reward of incapacity, or a dislike to exertion, to put it mildly.

And we are so convinced that the average Canadian appreciates this view as to believe that it will be a long time before the insidious leaven which is at present permeating the working classes of Great Britain, and which threatens to reduce them to a host of state fed paupers as were the citizens of degenerate Rome, will begin to work in Canada.

Therefore we fear that the persons who write so luridly and so sympathetically about the woes of Canadian workingmen are weaving ropes of sand. Nova Scotian workmen, in particular, must be getting quite case-hardened to the heart stirring depictions of their parlous case that daily appear in their newspapers, and by this time they must be about as effective as sermons usually are.

ONTARIO.

Cobalt.

The rails have been laid as far as the Lawson mine on the Kerr Lake branch of the T. & N. O. R. R. The track will shortly be completed to the terminal at the Drummond mine. This will effect a very great saving in mining costs of some of the important shipping mines, and a large number of promising prospects. The Kerr Lake, the Drummond, Foster, Cobalt Central, Silver Leaf, Crown Reserve and Lawson will be able to load ore and unload coal and supplies from cars directly on the property. The Temiskaming, Badger, Beaver, Rochester, Shamrock and many others in this section will with the completion of the improvement of the wagon road also be in a much better position to get in supplies and ship ore.

The activity in the southeast section of the Cobalt camp, which resulted from the discovery of a good vein on the Shamrock, and the very satisfactory development of the Badger, has affected a large majority of the properties in this section. At the Rochester mine ten men are now employed and one drill in operation drifting at the 50-foot level, the management hope to be in a position to largely increase their working force in the near future. A small force of men has been employed trenching and stripping on the Cobalt Merger.

The shareholders of the Beaver Consolidated have authorisd the issue of 480,000 shares of stock to the shareholders of record for the purpose of providing funds for further development of the property. Twenty men are now employed, No. 1 shaft which is down 110 feet will be sunk to a depth of 200 feet and drifting started at this level.

At the Shamrock 22 men are now employed. The shaft is being sunk to a depth of 150 feet. It is the intention to cross cut to the vein recently located with a diamond drill. The foundation and buildings for the new plant are well under way.

On the Coleman development property cornering on the Temiskaming, a vein from five to six feet wide of calcite and quartz with smaltite galena and small silver values has been found. A test pit is being sunk on this vein and a drift started from the main shaft, on the No. 1 vein at the 100-foot level to strike the new vein. Thirty men are employed under the management of A. R. Webster. A new compressor has been installed and is now in operation.

The shaft on the Paterson property, which adjoins the Cobalt Development, is now down 70 feet and will be sunk to the 150-foot level.

A contract has been let to sink the shaft on the Progress to a depth of 100 feet and trenching will be started on several leads.

On the Wetlauffer property preparations are being made to start work at once.

Little Nipissing.—This company has leased the property of the Amalgamated Cobalt lying directly east of and adjoining the Trethewey mine.

The work on the Peterson Lake lease of this company is progressing very satisfactorily. The shaft is now down fifty feet. On June 9, a car of ore was shipped to Copper Cliffe, another will be shipped within a few weeks.

Cobalt Lake.—Mr. Justice Riddell has given judgment in the action of the Florence Mining Company vs. the Cobalt Lake Mining Company. The decision dismisses the action with costs from April 20, 1907, the date of the Act of Legislature confirming the title in the Cobalt Lake Company. Justice Riddell says in part: "It seems to me the only recourse for the plaintiffs is to appeal for consideration of the Lieutenant Governor in Council, with the manner in which such an appeal should be dealt with the Court has nothing to do."

Mr. Fraleck, the engineer in charge, in his recent report to the management states as follows:

"Re mining.—The north shaft is now down 139½ feet. At the 130 foot level a drift has been started towards the lake, a distance of twelve feet. The work for this machine for the past month comprises 21½ feet of sinking, 12 feet of drifting and in addition to this, the level station has been timbered.

No. 4, 1st level. The north cross cut is now in 318 feet from No. 3, or 421 feet from the drift on No. 4, making the driving for this machine duirng the month, 53 feet, and in addition this cut to the south is now in a distance of 360 feet, making the driving for his machine for the month, 70 feet.

2nd level. The north cross cut is now in a distance of 123 feet and the west drift is out underneath the lake a distance of 209 feet, making 63 feet of driving for this machine.

No. 6 shaft. This shaft has been sunk to a depth of 14 feet, with 45 feet of driving at the 138 foot level, making

three feet of sinking and 35 feet drifting for this machine, but in addition the level station and the bottom portion of the shaft has been timbered and planked during the month.

Our total footage for the month was 257½ feet.

Crown Reserve.—The foundations for the new plant have been completed and work started on the buildings. The plant will consist of a six drill Sullivan compressor, 100 h.p. Jenckes boiler, an Allis-Chalmers hoist, etc. A complete electric light plant will also be installed. It is expected that the plant will be in operation by July 15th. The working shaft will be sunk fifteen feet deeper to the 100-foot level and a cross cut run to the big vein.

City of Cobalt.—An option for 30 days has been given to an English syndicate. An engineer representing the syndicate is now examining the property. On June 10th, the directors declared a dividend of three per cent. with a two per cent. bonus payable July 10th.

Red Rock.—Drifting has been started at the 100-foot level. Twenty men are now employed.

Trinity Cobalt.—The compressor and boiler recently ordered have been delivered on the property and will be set up at once. The shaft which is being sunk on the shore of Cross Lake, is now down 25 feet.

T. & H. B.—Another dividend of $2 per share will be declared this month, making a total of $103 in dividends on every share.

Silver Cliff.—Dr. Beattie Nesbitt and associates have taken a working bond on this property, which lies directly north of the King Edward. Five machine drills are being run, power being obtained from the King Edward and Colonial.

Coniagas.—A thirty stamp battery with 1,250 pound stamps, is to be installed.

Montreal River District.

The recorder of this district, Mr. Thos. H. Torrance, received instructions on June 18th, to take immediate steps to move the office from Latchford to Elk Lake. Mr. Torrance will arrange for the construction of the necessary office building at once. This decision of the department is a very wise one and will be received with great satisfaction by the miners and prospectors in the various camps in the vicinity of Elk Lake. The mail service is so very unsatisfactory at all seasons and the difficulty of getting in to and out of this district in the winter months is so great that the necessity of going to Latchford, 52 miles away, to conduct all business in connection with the Recorder's Office or Department of Mines, has entailed a very considerable hardship on the prospectors. Under the present conditions it is also much more satisfactory for all parties concerned that the hearing of disputes and settlement of the many troublesome questions arising from under the Mines Act, be heard and decided on the ground. Elk City is beyond question the most central point for the seven or eight hundred men now in the district and is rapidly becoming a substantial town.

Semi-official announcement has been made that only one inspector has been assigned to this district and no inspection will be made except of disputed claims or at the request of the licensee.

Cobalt.

The flotation of the La Rose Merger has been the most important event, affecting the camp, that has happened for some time. It means the active development of properties of merit that have been lying idle for so long. It also means a greatly increased production from La Rose itself, where until now nothing but development work has been going on and ore taken out in that work is all that has been shipped. There is actually blocked out, a greater value in high grade ore, in this one mine, than the total capitalization of the Merger, namely $7,500,000. There is a large tonnage of low grade ore on the dump and blocked out in the mine, and undoubtedly a concentrator will soon be put up.

Crown Reserve.—A car of ore, 22 tons in weight, was shipped to Copper Cliff on the 5th inst. Taking the probable value of this car into consideration, about $135,000 worth of ore has been shipped to date.

T. & H. B.—On the 8th of June a dividend of $2 per share was paid. This brings the dividends paid per share to $101. There are about 7,700 shares issued, the capitalization being $25,000.

Century.—A small force which is to be increased very shortly, is at work here sinking a shaft. The shaft is down 84 feet and a contract has been let to sink an additional 40 feet. A boiler hoist and pump have been installed.

Temagami Reserve.—An option has been given on the Stirling mine at Arsenic Lake near Temagami. Work will be started at once. The ore deposits are big, comparatively low grade ones. The ores are copper-gold bearing mispickel. Five leads have been opened up. From a cut on one of the mispickel leads, 100 tons have been taken, now on the dump, that will average 30 per cent. arsenic and $12 in gold and silver.

ALBERTA.

Lethbridge.

The past few weeks have seen some very heavy rains in this district. These rains have been welcomed by the farmers as assuring them a bountiful crop in the fall. Miners and all classes of the community have likewise appreciated the rain as good crops mean good business for the West and good business means good coal trade. However, the rains have not been an unmixed blessing, as all the mountain streams are in heavy flood and considerable damage has been done to bridges, etc. The Belly river overflowed its banks and did a great amount of damage, all the "flats" being flooded.

The Alberta Railway & Irrigation Company have considerable mine workings lying under these "flats" and in some cases where pillars were drawn the caves had gone right up to the surface. It was foreseen some time ago that should these "flats" be flooded the water would find its way into the mine, and in anticipation of this several dams had been built. As expected the water soon began to flow into the mine when the river overflowed, and had it not been for these dams confining the water to one district, the whole mine would have been flooded.

It is the intention of the company to pump out this water as soon as additional pumping machinery can be laid down. It is supposed that it will take several months to finally free the workings from water.

The mines are only working two and three days per week, but is is reported that better time may be made in the near future.

Bankhead.

Mr. John Galvin, vice president of District No. 18, U. M. W. of A., has been negotiating with the management of the Bankhead Mines Limited, with a view to setting a contract price on pillar drawing in No. 5 seam. Mr. Galvin and the Local Committee met the management but failed to come to an agreement and the question has been referred to the Disputes Board for settlement. This board meets in the middle of each month to decide all cases which cannot be settled direct at the mines.

At present the pillars are being taken out by day labor, the rate of wages being the union rate of $3 per day, and the management claim that the contract price the men are asking would mean a wage very much in excess of this.

BRITISH COLUMBIA.

Michel.

The dispute between the Crow's Nest Pass Coal Company and its employees has been settled at a meeting between the district officers of the union and the management. The men who were discharged, have been reinstated, while the case of the employment of Henry Marchant, over whose non-employment the trouble started, has been dropped.

It now appears that Marchant is not a union man and the union therefore refuse to further his case. The action of the secretary of the Michel Local union is being strongly condemned on every hand, and it is the opinion of the district officers that every greivance of the Michel miners could have been settled without losing a single day's work.

Rossland.

On the Surprise and You Know portion of the Le Roi Two property an active campaign of development work by diamond drilling is in progress. The surface showing on these claims is very promising and the management are of the opinion that the time has arrived to further prospect these indications of ore. The output of the Le Roi No. 2, Limited, for May was 2,410 tons and some of the ore gave an average assay of 3.77 ounces gold and 6.7 per cent copper, making it worth $88.80 per ton. The lode in which these values were found was of an average width of two feet and another vein of an average width of four feet one inch carried 2.82 oz. gold and 9.7 per cent. copper, equal to $79.68 per ton.

In the lower levels of the Le Roi mine encouraging results are being obtained and once more the affairs of this concern are brightening. It is expected that the gross receipts from the operation of the mine during May will equal those of April, if they do not exceed them, and as the April receipts were $90,000 if those for May are greater it will tend to show that things are getting better with the big mine, and that the results of the campaign of extensive development work carried on last year are about to be realized.

The shipments for the week ending June 6th, and for the year to date, from Rossland camp show the following tonnage shipped:

	Week.	Year.
Centre Star	3,860	76,971
Le Roi	1,610	37,349
Le Roi No. 2, Limited	385	11,919
Giant California	....	95
Blue Bird	....	110
Red Eagle	....	20
Evening Star	....	428
Total	5,855	126,892

Work is going on in a busy manner around the small properties of the camp and a busy and profitable summer is looked forward to.

Phoenix.

The shipments from this district for the week ending June 6th, amounted to 25,807 tons, of which the Granby shipped 18,051 and the B. C. Copper Company properties 7,756 tons. This runs up the total amount of the Boundary for the year to date to 478,244 tons.

The information that the Granby Company had declared dividend of two per cent. payable June 13th, on their outstanding stock was welcome news to the many shareholders throughout this section and also to the business interests here generally. This act augurs well for the season's work that now lies before the Boundary miners. There will be no child's play in the winning of dividends from Mother Earth's stores of gold and copper in that section, but the sharpest and most far-seeing minds will have to use their best efforts to bring about this much desired result, owing to the low price of copper and the other difficulties to be contended with.

This is dividend number nine to be paid by the Granby since 1903, they having divided profits in these nine dividends with their stockholders to the sum of $3,238,630, this, of course, including the dividend now declared and about to be paid. Up to date the Boundary mines have paid $3,806,776 in dividends; the B. C. Copper Company having paid $201,200; Cariboo-McKinney, $546,837; Consolidated Company of Canada, $781,885, and the Providence $38,224, in addition to the above named sum distributed by the Granby.

Work at the B. C. Copper Company smelter has been started since last writing and the plant is now handling about 1,950 tons of ore daily. During the week ending June 13th, this smelter treated 12,215 tons. The Granby smelter for the same week treated 19,030 tons of ore, the ore shipments averaging about the same as for the week mentioned above. Four cars of blister copper were sent away from the B. C. Copper Company's smelter during this last week, and the new Rand duplex compressor which will be one of the largest and most up to date machines in the country, is expected to be making air within a few days now. One of the prime features of this machine is that it cuts out automatically to only 75, 50 or 25 per cent. of its capacity (3474 cubic feet) and consequently only consumes a proportional amount of power; making no more air than is being used. The compressor is driven by a 600 h.p. motor—rope drive.

The total ore shipments from the Granby for May totaled 93,316 tons, which is the greatest quantity ever shipped from the mines, with the exception of March. While all of the smelters furnace equipment was in operation in March, however, two of the furnaces were out of commission most of the time during May. For the first five months of this year the Granby shipments are 294,317 tons, a third more than for the same period last year, which is a pretty good showing under existing circumstances.

Events are so shaping themselves that work will be started on the Dominion Copper Company interests here in the near future. Preliminary statements to this effect have been received with gratification here. It is expected that the final word will be given shortly after the convention of the company's officials at Salt Lake City.

The Phoenix M. S. & D. Company recently formed has added another promising claim to its list of properties. Work on the E. P. U. is being steadily executed and in the course of the work this week at a point 900 feet in the tunnel another stringer was cut which gave an assay of $145.

A one quarter interest in the Ajax and all of the Munster claim are to be sold at auction to satisfy a judgment obtained by F. M. Kerby against the McKinley Mines, Limited, for $406.80.

Nelson.

At the Queen Victoria mine, on which there is one of the largest showings of low grade copper ore in this district, a careful sampling of the property has been made and a 100-ton lot shipped to the Northport smelter for a test. Work has been resumed on the Buffalo, under management of Bruce White. The controlling interest in the Buffalo is held by Spokane mining men who are determined to give close attention to development work on the property. A mine that was a shipper from the Slocan twenty years ago, the Alpha, is once more being worked and the near future may see this old timer once again on the shipping list.

The Free Silver group, on Quartz Creek, is to be developed

extensively this coming season. There is a promising showing of galena on the group and the men behind the scheme are of sterling character.

Now that it is a forgone conclusion that the lead bounty will be extended for another five years, from June 30th, and with the two or three improved features which it will embody, the lead miners of the Slocan are already lying back with a sigh of relief, assured that for this further period they will be assured of a stable minimum price on the product of their mines.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney Mines.—The closing of the iron and steel departments of the Nova Scotia Steel & Coal Company will reduce the output of the company's collieries by several hundred tons per day. The rumours of labor difficulties have been greatly exaggerated. The suspension of active work in the iron and steel departments is due to the fact that heavy stocks are now on hand.

The closing of the company's open hearth and blast furnace plants mean the throwing out of about 800 men engaged in these departments, with a pay roll of about $40,000 to $50,000 per month.

This does not take into consideration the effect this closing of the steel plants may have on the output of the mines.

The amount of coal consumed at the blast furnaces and open hearth is 600 tons per day, which represents the output of about 200 men engaged directly and indirectly in the handling and mining of this amount of coal.

The company have now this additional 600 tons of coal per day to find a market for.

Sydney Mines.—The new mine, Sydney No. 4, of the Nova Scotia Steel Company, commenced to be a producer on a promising scale on the first of the month. The management made no attempts at an output until everything was in readiness for a good start. The output for the first week of operation was expected to be 400 tons per day, and this ought to be doubled as soon as another machine is installed.

The company's coal shipments for May and the five months were as follows:

Shipments, May 1908	67,758
Shipments, May 1907	43,348
Increase, May 1908	24,410
Shipments, 5 months, 1908	223,495
Shipments, 5 months 1907	163,627
Increase, 5 months 1908	59,868

Sydney.—Three steamers are expected by the Dominion Steel Company to load rails for lake points for the Canadian Pacific, Canadian Northern and National Transcontinental Railways. Each of these vessels will carry 6,000 tons of finished steel. Arrangements have been made by the Steel Company to load twelve steamers with rails during the next two months, all of which will be shipped to lake points. American engineers, presumably of the Hill system, are at Winnipeg watching the results after the Cape Breton rails have been placed, and should they prove satisfactory, it is the intention to place several large orders with the Dominion Steel Company. The local plant is running twenty-four hours, with every skilled laborer available in harness.

Sydney.—The Dominion Iron & Steel Company has purchased half the property known as the Carlins Farm in the vicinity of the company's blast furnaces. It is believed that the object of the purchase is to allow the company latitude to ultimately increase its blast furnaces equipment.

Glace Bay.—From figures secured it is found that 810 of the Dominion Coal Company employees were off duty on Monday following pay day—that is, 10 per cent. of the total number employed. There were no picnics or other attractions to cause this.

The company figures that they lose at least 130,000 tons of coal per year by men absenting themselves from work.

The loss in wages to the men is $130,000; to the Government in royalty, $16,250, besides the value of the coal and the company's profit. This staying off work costs Cape Breton half a million dollars annually. Lay-offs are due largely to picnics and pay days.

ONTARIO.

Cobalt.—The Chambers-Ferland property, which is the basis of latest flotation on the Toronto and New York exchanges, comprises 124 acres adjacent to the La Rose, Nipissing, O'Brien, and Right of Way. It is under the same penalty as the O'Brien—the necessity of paying a royalty of 25 per cent. to the Ontario Government. Messrs. Frank Loring, M.E., and J. Edwards Leckie reported on the mine for the promoter, C. J. McCuaig of Montreal. The capitalization is $2,500,000 with but $300,000 in the treasury.

Port Arthur.—The Beaver Superior mill is being equipped. Twelve months' supply of ore is said to be stoped out.

ALBERTA.

Coleman.—More coke ovens are to be built at the works of the International Coal & Coke Company. The number at present in commission is 200. This is to be doubled. Materials are already assembled and ground has been broken.

BRITISH COLUMBIA.

Hazelton.—Returning prospectors from the Dighy river gold fields bring many contradictory reports. A few facts, however, are to be accepted on their face. Prospectors may choose one of two trails, the Omenica and the N. W. M. Police trail. On the latter trail the Skeena has to be crossed twice. Pack horses must swim the current and packs are taken over in boats. On the Omenica trail there is only one small stream to ford. A trail is being blazed to Bear Lake. Supplies are scarce and horses are difficult to obtain.

Phoenix.—Official notice was received early in June that the mines and smelters of the Dominion Copper Company would resume work on June 15th, and instructions were forwarded to get everything into shape. The interest on $8[illegible] of 6 per cent. bonds has been settled. All the machinery is in good condition. At the Boundary Falls smelter sufficient fuel in stock to last for a month. There is also seven days' ore supply there in the bins. The Rawhide mine, with its enlarged trackage will be able to output 1,000 tons per day.

Vancouver.—The Ikeda mines, on Ikeda Bay, Moresby Island, send now about two hundred tons of ore per month to the Ladysmith smelter. This ore is won largely by development work. A four drill compressor has been installed and

larger shipments will hereafter be made. A figure of 2,000 tons per month is expeteed. The hand sorted ore carries 12 per cent. copper, $5 gold, and sixty ounces silver per ton. A dump of 1,000 tons second grade ore carries 8 per cent. copper and slightly less gold and silver than the first grade. Eighty-seven men are employed. Four tunnels open up the ore-body. The vein varies in size from five feet of high grade ore to eleven feet of low grade. Ore bunkers are being built.

YUKON.

Dawson.—The claim in 38 below Hunker, mostly unworked ground and supposed to be very valuable, was relocated by three Dawson citizens on May 19th. The Guggenheim dredge No. 7 is working immediately above this claim.

Dawson City.—Dave Cunningham, a miner working on No. 3a, below Discovery on Last Chance, made a brave rescue recently. A young Slav was overcome by gas whilst working in a shaft on the claim. His partner deserted him; Cunningham hurried down the shaft, made fast a rope about the unconscious man, and, after reaching the surface, worked for three hours in resuscitating the victim. His efforts were successful. Cunningham's bravery was the sensation of the day.

The Bear Creek dredge, the pioneer large machine on the Klondike river, is running in good form. The ladder has been lengthened seven feet and new buckets have replaced the old.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The general report relating to mines and quarries for 1907 shows a total output of coal for the United Kingdom amounting to 267,830,962 tons, as compared with 251,067,628 tons in 1906. The production of iron ore was 15,731,604 tons, as compared with 15,500,406. The total number of persons employed in or about the mines was 972,220. At the mines under the Coal Mines Ast there were 1,245 deaths by accident, an increase of 29. The mines under the Metalliferous Mines Act had 34 fatalities, and there were 89 deaths by accident in the quarries, being a slight decrease in both cases.

A committee of coal owners in the Swansea districts has been formed for the establishment of a central rescue station at Swansea for the training of men in rescue work.

The Conselt Iron Company, of Newcastle-on-Tyne, has associated with a number of British, German, French and Belgian iron manufacturers to open up iron ore deposits in Algeria, where mining experts report a large quantity of ore of good quality about 100 miles inland from the port of Bona.

NORWAY.

The government has granted a concession for the Rustvangen mines in Hedemarken, to the Pehrson & Dovre Company for 75 years, the property to revert at the end of that period to the State without compensation. Only Norwegians are to be employed, and all material must be bought in Norway so long as it is not 10 per cent. dearer than that obtainable abroad.

RUSSIA.

A rich find of gold has been made in the lands of the Avriano-Petrovoski works of Orenburg province and development work has been begun.

Near the village of Biacly Klyutch, in Tiflis district, large deposits of manganese ore have been discovered by prospectors. The metal content is given as over 65 per cent.

UNITED STATES.

A new mining camp in Nevada, situated near Cactus Springs, 22 miles east of Goldfield, and within 15 miles of the San Pedro Railroad, has been christened "Rockefeller."

The United States Steel Corporation has taken over the iron ore properties of the W. L. Le Rue and Robert Whiteside of Duluth, in the Baraboo district, Wisconsin, and is preparing to undertake the development of mines. The only shipping property yet developed in this field is the Illinois mine of the International Harvester Company.

In May the two mines of the Butte district, Montana, produced about 27,537,300 pounds of copper from 346,425 tons of ore.

The consolidation of a number of producing zinc mines in Wisconsin is being negotiated at Benton with the object of erecting a joint ore-separating plant of the galena roast type.

MEXICO.

The new smelter of the Douglas Copper Company at Fundicion, Sonora, has been blown in and is expected to be an important factor in the development of mining ore on the west coast of Mexico. Hitherto all ore had to be shipped in the crude state to distant points for shipment. The smelter was mainly constructed to treat ore from the company's neighboring mines, and so far only the first unit of the plant has been installed, but with the development of theindustry it is expected that outside supplies will be extensively purchased.

The Benito Juarez Company has received machinery for its 150-ton mill and cyanide plant at Penon Blanco, San Luis Potosi. The plant will have a battery of 1,050 stamps and there will be 23 steel cyanide tanks for sand and slime treatment.

The Cananea Consolidated Copper Company has been granted a concession by the Mexican government for prospecting for oil in the State of Sonoro. The company will use oil in place of coal in its operations.

AUSTRALASIA.

There are nearly 1,000 miners at the Oaks Rush, Queensland where gold has been found at various points over an area extending for three miles. At the Three Nobs rich stone is being obtained at a depth of 30 feet.

A large deposit of iron ore is being opened up about six miles north of Mudgee Township near Lowes Peak, New South Wales. Two hundred tons have been sent to Lithgow for treatment and of the bulk sample proves equal to former tests an important industry will be established.

The lack of a sufficient water supply threatens to cause the closing down of the Great Cobar copper mine, New South Wales, employing 960 men.

In the Hill End country, New South Wales, quicksilver has been discovered in two places a mile apart.

SOUTH AFRICA.

Further substantial reductions in Rand working cost were made in April last. In the eight mines of the Eckstein Central Administration group, the average cost per ton milled was cut down to 17s. ¾d. The Robinson company records working

costs for the same month as 12s. 9-8d., as compared with 13s. in March.

What is claimed to be a world's record in underground driving has been made by two men employed on the Simmer Deep property, who carried a drive 24 feet in 61 consecutive shifts of 10 hours each. The size of the drive was 5 feet by 7 feet. One white man and six Chinese were employed on each shift, and they operated three Ingersoll-Sergeant rock drills on a bar.

CHINA.

The East Chinese Railway Company has for some years been working several coal mines in the Usswri district of Manchuria, and has recently started to work on two new coal deposits not far from the Lihmienpo and Harbin stations. The total requirement of coal for the road will bes upplied by these mines in future, and the company has organized a special department for their management.

STATISTICS AND RETURNS.

Outputs of Dominion Coal Company, June 1st to 15th, 1908.

No. 1	28,280
No. 2	34,980
No. 3	17,460
No. 4	21,240
No. 5	25,770
No. 6	11,940
No. 7	6,500
No. 8	11,130
No. 9	18,460
No. 10	8,620
Total	184,380

International Coal Company, Westville, N. S.

Shipments, May, 1908	22,623
Shipments, May 1907	24,813
Decrease, May, 1908	2,190
Shipments, 5 months, 1908	112,678
Shipments, 5 months, 1907	109,553
Increase, 5 months, 1908	3,125

Acadia Coal Company, Stellarton, N. S.

Shipments, May, 1908	25,483
Shipments, May, 1907	24,047
Increase, May, 1908	1,436
Shipments, 5 months, 1908	131,898
Shipments, 5 months, 1907	112,255
Increase, 5 months, 1908	19,643

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp and those from Jan. 1st to date:.

	Week end. June 13.	Since Jan. 1.
Coniagas	63,100	568,680
Kerr Lake	57,980	462,300
McKinley	123,600	1,497,160
Nova Scotia	43,990	271,545
Little Nipissing	40,110	40,110
O'Brien	276,330	2,817,300
Right of Way	61,050	303,290
Temiskaming & H. B.	65,000	664,000
Trethewey	67,600	1,065,056

The total shipments for the week were 878,760 pounds, or 439 tons. The total shipment from Jan. 1st to date are 15,874, 508 pounds, or 7,937 tons.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ended June 12 totalled 22,769 tons, a daily average of 3,795 tons.

Following are the weekly shipments from Cobalt camp, and those from January 1st to date:

	Week end. June 20.	Since Jan. 1.
Buffalo		653,710
Coniagas		568,680
Cobalt Lake		246,455
Crown Reserve		84,000
Cobalt Central*		156,380
City of Cobalt		452,110
Drummond		148,000
Foster		238,400
Kerr Lake		462,300
King Edward		127,240
La Rose	104,670	2,486,322
McKinley	60,000	1,557,160
Nipissing	239,880	1,982,000
Nova Scotia		271,545
Little Nipissing		40,110
Nancy Helen		140,429
O'Brien	128,120	2,945,420
Right of Way		303,290
Provincial		144,210
Silver Leaf		196,620
Silver Cliff		52,000
Silver Queen		634,510
Townsite		85,100
Temiskaming & H. B.		664,000
Temiskaming		325,000
Trethewey	65,670	1,130,726
Watts		246,020

The total shipments for the week were 598,340 pounds, or 299 tons. The total shipments from January 1st to date are 16,533,118 pounds, or 8,266 tons.

*Concentrates.

Cobalt's output shows a big increase over last year. The tonnage of the first five months of 1908 is 2,649 tons more than that of the corresponding period of 1907.

The following monthly table shows the shipments of the camp for the first five months of the years 1907 and 1908:

	1907.	1908.	Inc.
January	908	1,325	345
February	993	1,173	279
March	1,027	1,832	805
May	1,158	1,601	443
April	533	1,317	784

Total shipments for five months, 1907, 4,662 tons; 1908, 7,257 tons; increase, 2,649 tons.

British Columbia ore shipments for week ending June 6th:

The shipments from the mines and the receipts at the smelters of the districts of South-eastern British Columbia for the past week and year to date were:

Ore Shipments.

	Week.	Year.
Boundary shipments—		
Granby	17,339	479,860
Mother Lode	5,476	17,202
Oro Denoro	3,270	6,740
Other mines	.....	545
Total	26,085	504,347
Rossland—		
Centre Star	2,612	76,888
Le Roi	1,556	35,883
Le Roi No. 2	546	13,433
Other mines	.....	518
Total	4,714	126,722
East of Boundary river—		
Whitewater (milled)	280	6,580
Poorman (milled)	250	5,100
Queen (milled)	185	4,245
Second Relief (milled)	140	2,535
St. Eugene	89	9,139
North Star	73	1,254
Silver Cup	31	250
Ymir	22	43
Other mines	.....	15,328
Total	1,070	45,287
Grand total	31,869	676,356

Smelter Receipts.

Grand Forks	17,339	479,860
Trail	4,284	122,572
Greenwood	8,746	23,942
Northport (Le Roi)	1,748	38,495
Marysville	.....	5,730
Total	32,117	670,599

The output of the Crow's Nest Pass Coal collieries for the week ending June 19 was 24,273 tons; daily average of 4,047 tons.

Following are the figures of German consumption of foreign coper for the months, January to April, 1908:

	Tons.
Imports of copper	56,533
Exports of copper	2,723
Consumption of copper	53,810

as compared with consumption during the same period in 1907, of 36,225 tons.

Of the above quantity 52,259 tons were imported from the United States.

Reported by L. Vogelstein & Company, New York.

Production of Coal in United States for 1907.

In the year 1907, coal production in the United States reached high water mark. The increase in production over 1906 was 66,292,764 short tons, or 16.01 per cent. in quantity, and $101,751,749 or 19.83 per cent. in value. The following table gives the quantity and value of the coal production in the United States in 1907, by States:

State.	Quantity (short tons.)	Value.
Alabama	14,250,454	$18,405,468
Arkansas	2,670,438	4,473,693
California and Alaska	24,089	91,813
Colorado	10,790,236	15,079,449
Georgia	362,401	449,686
Idaho	a7,588	a31,119
Illinois	51,317,146	54,687,382
Indiana	13,985,713	15,114,300
Iowa	7,574,322	12,258,012
Kansas	7,322,449	11,159,698
Kentucky	10,753,124	11,405,038
Maryland	5,532,628	6,623,697
Michigan	2,035,858	3,660,833
Missouri	3,906,294	6,399,616
Montana	2,016,857	3,907,082
New Mexico	2,628,959	3,832,128
North Dakota	347,760	560,199
Ohio	32,142,419	35,324,128
Oklahoma (Ind. T.)	3,642,658	7,433,914
Oregon	70,981	166,304
Pennsylvaia:		
Anthracite	85,604,312	163,584,056
Bituminous	150,321,437	155,837,770
Tennessee	6,810,243	8,490,334
Texas	1,618,069	2,778,811
Utah	1,947,607	2,959,769
Virginia	4,710,895	4,807,533
Washington	3,680,532	7,679,801
West Virginia	48,091,583	47,846,630
Wyoming	6,252,990	9,732,668
Total	480,450,042	614,831,549

a. Includes production of Nebraska and Nevada.

Great Britain's production of coal in 1907 was 267, 828, 276 long tons, or 299,969,669 short tons, and Great Britain is the second coal producing country of the world. The coal production of the United States in 1907 exceeded by 180,480,373 short tons, or more than 60 per cent. that of the British Isles. It was more than double that of Germany, and was equal to 40 per cent. of the total coal production of the world.

COMPANY NOTES.

The Crown Reserve Mining Company, Limited, has declared a half yearly dividend of four per cent. for the current year ending June 30,being at the rate of eight per cent. per annum. The dividend is payable only to shareholders of record on June 15th.

The directors of the Nova Scotia Steel & Coal Company on June 13th declared the usual dividend of two per cent. on the preferred stock payable July 15th, to shareholders of record June 30th. The transfer books will be closed from July 1st to 5th, inclusive. The directors decided not to pay any dividend on the comon stock for the quarter ending June 30th.

The annual meeting of the Dominion Iron & Steel Company will be held on June 25, and the annual statement to be presented then was made public in Montreal to-day. The company's fiscal year ended May 31st, and it is pointed out that the earnings of the company have again to be considered in the light of the judgment against the Dominion Coal Company. In the previous year, all the coal used has been charged against

operations at the contract price of $1.28 per ton. Interest charges for the year amounted to $696,814, and the net earnings were $1,917,011. From this there has been transferred to contingent account $1,376,831 to offset the sum which has been charged to the Dominion Coal Company for money paid during the year in excess of contract prices for coal. The remainder has provided for the sinking fund on first mortgage bonds, and maturing instalment of second mortgage bonds, leaving a balance of $220,417. Gross earnings were $2,613,815, compared with $2,247,566 for the preceding year. The output of steel was 280,00 tons, against 255,500 last year.

The directors of the Kerr Lake Mining Company on June 9th declared their eleventh regular quarterly dividend of two per cent and a bonus of one per cent. on the capital stock of the company, payable July 1st, 1908.

The Temiskaming Mining Company on June 18th declared a dividend of three per cent. on the par value of each share issued, payable July 1st, 1908.

The City of Cobalt Mining Company has declared a dividend of three per cent., with a bonus of two per cent., payable on July 1st, 1908.

Dominion Steel Company's Claims.

The Steel Company's claim of damages against the Coal Company is as follows up to May 31:

Paid for extra cost of coal purchased from Dominion Coal Company	$1,847,550.18
Paid for extra cost of coal purchased from others	465,005.76
Damages due to short deliveries in August, September and October, 1906	132,252.75
Damages due to cessation of deliveries in November, 1906, estimated	479,000.00
	$2,923,808.69

The interest to the same date amounted to over $80,000.

MARKET REPORTS.

Coke.

June 22—Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.50.
Foundry coke, prompt, $2 to $2.10.

Pig Iron.

June 22—Pittsburg—

No. 2 foundry, $15.50 to $15.90.
Bessemer, $16.90 to $17.15.
Basic, $16.15 to $16.40.
Malleable, $15.90 to $16.40.
Southern No. 2, $16.40 to $16.90.

Other Metals.

June 22—

Tin, Straits, 27.95 cents.
Copper, prime lake, 13 cents.
Lake, arsenical brands, 12.9 cents.
Electrolytic copper, 12.9 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.55 cents.
Spelter, 4.60 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.60 to 8.65 cents.
Aluminium, 33 to 35 cents.
Nickel, 45 to 47 cents.
Platinum, $21 to $24 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $43.50 per 75 pound flask.

Silver Prices.

	New York. Cents.	London. Pence.
June 8	52⅞	24⅜
June 9	53	24 7-16
June 10	53⅛	24½
June 11	53⅜	24⅝
June 12	53⅜	24⅝
June 13	53⅜	24⅝
June 15	54	24⅞
June 16	53⅞	24⅞
June 17	53⅞	24⅞
June 18	54⅛	25 1-16
June 19	54⅛	25⅛
June 20	54¼	25 1-16
June 22	54½	25⅛
June 23	55⅛	25⅜

The first five months of 1908 show a decrease of £1,746,488 in silver shipments from London to the East as compared with 1907.

MARKET NOTES.

An advance of a dollar a ton in iron bars is predicted early in July. A large volume of business was booked in the first week of June in iron and steel bars.

The following table shows the present prices of certain classes of steel under the revised schedule, compared with a year ago:

	June 19 1908.	1907.
Bessemer iron	$16.50	$24.55
Bessemer billets	23.00	30.00
Plates	1.60	1.70
Structural steel	1.60	1.70
Wire nails	1.95	2.00
Iron bars	1.40	1.75
Steel bars	1.40	1.60
Sheets	2.40	2.50
Tin plates	3.89	4.00
Steel rails	28.00	28.00

It is estimated that the annual production of copper in the United States and Canada totals 1,000,000,000 pounds. The cost, making no allowance for depreciation, sinking funds, etc., is as follows:

250,000,000 lbs. ore produced at a cost of less than 10c per lb.
500,000,000 lbs. ore produced at a cost of about 12½c per lb.
250,000,000 lbs. ore produced at a cost of about or over 15c per lb.

The average cost of production is just about the present selling price.

Late in the week ending June 6th, Corrigan, McKinney & Company made a cut of 50 cents per ton on iron ore.

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2 30 K.W., 110-v. D.C. Generators, 800 r.p.m., multipolar, compound wound, complete with pulleys. In excellent condition.

1 60 K.W., 250-v. D.C. Generator, 700 r.p.m., 6-pole compound wound. This machine is also in first-class condition.

1 Duplex Pump (Worthington), 9" x 5¼" x 10". In good condition.

1 Pump (Union Steam Pump Co.), steam cylinder, 5 1/8" dia., 3 5/8" stroke. Pump cylinder 8" dia.

2 Six-ton, 19-ft. Jib Cranes (steel frame). In good condition.

1 5-ton, 17-ft. Jib Crane (steel frame), in good condition.

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Iron inlarge bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and in other forms; zincblende, galena, pyrite, mica, graphite, corundum, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HON. FRANK COCHRANE,
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Toronto, Canada.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and Europe is invited to the

Mineral Territory Open for Investment in the Province of Quebec

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc. **Ornamental and Structural Materials in abundant variety.** The Mining Law gives absolute security to title and has been specially framed for the encouragement of mining

All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St. Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

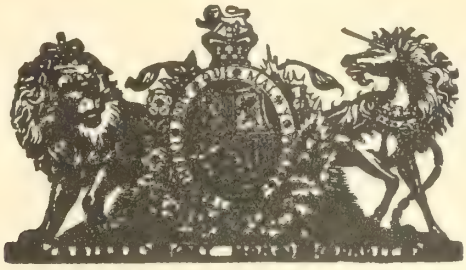
Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

HON. MINISTER OF MINES

Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.



Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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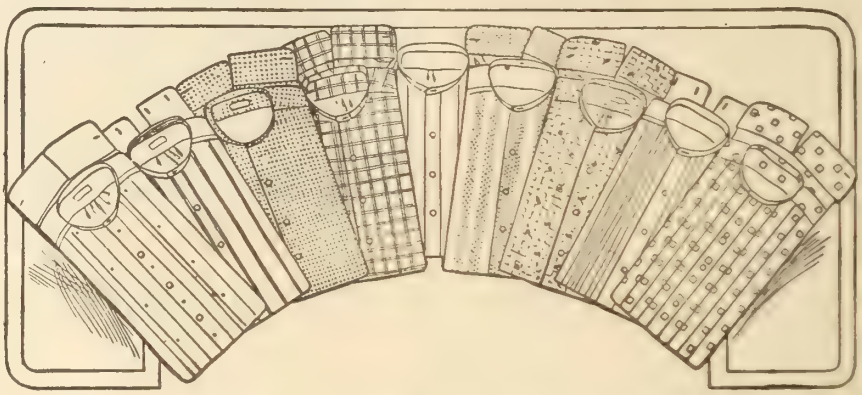
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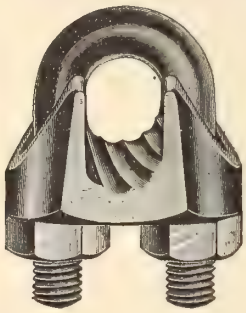
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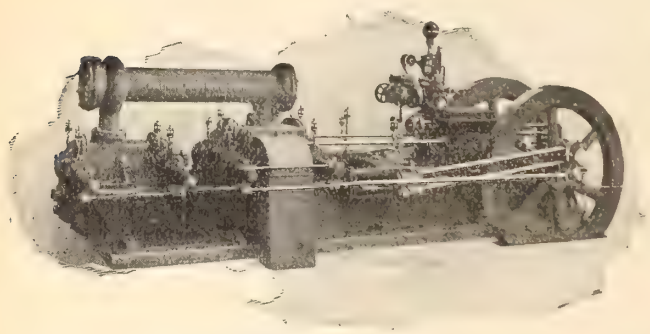
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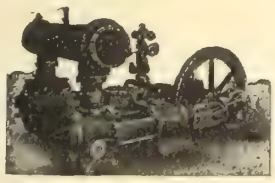
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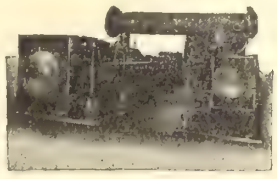
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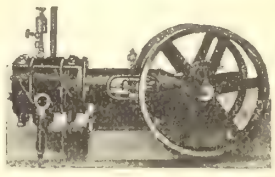
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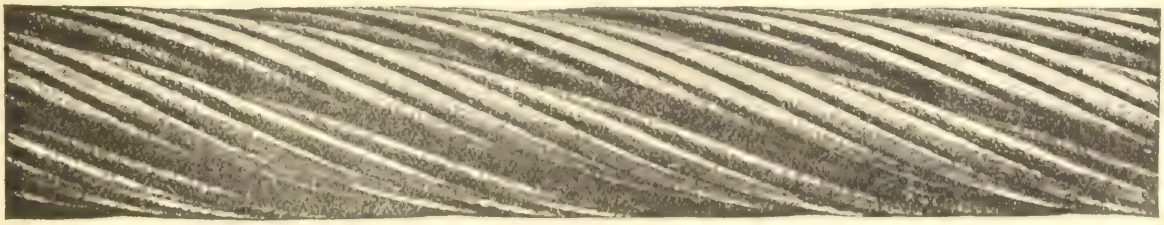


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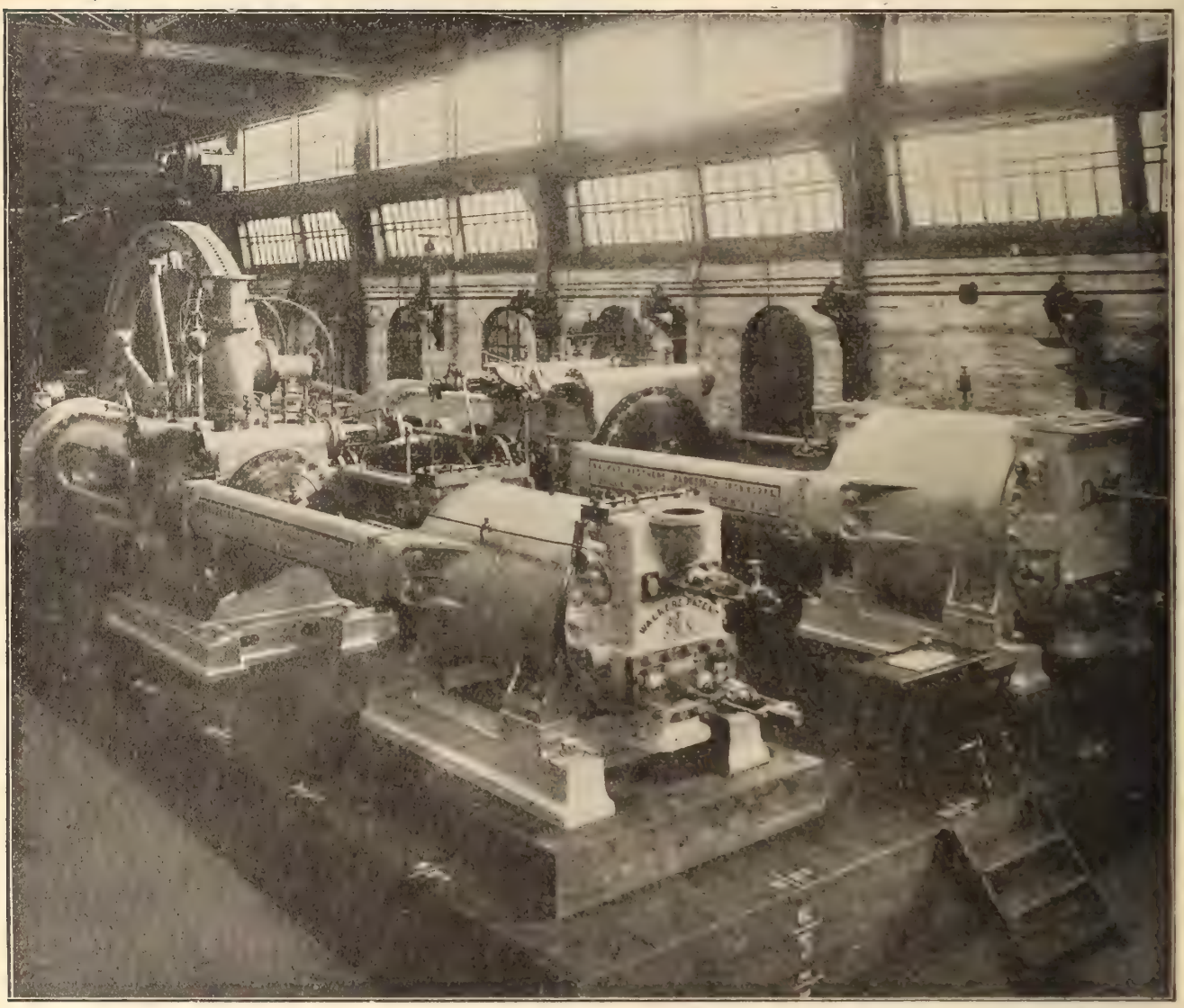
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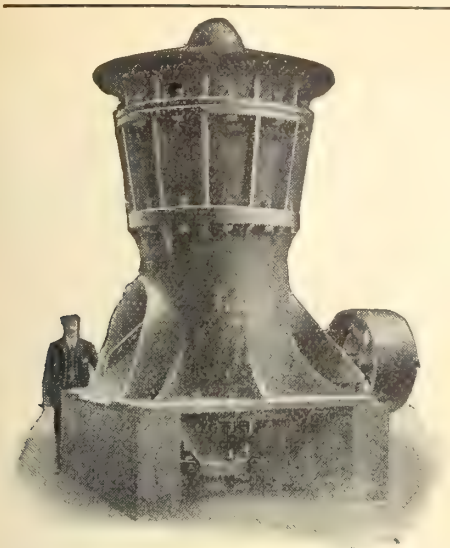
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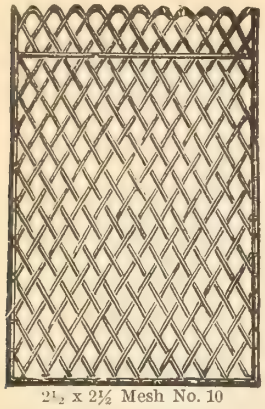
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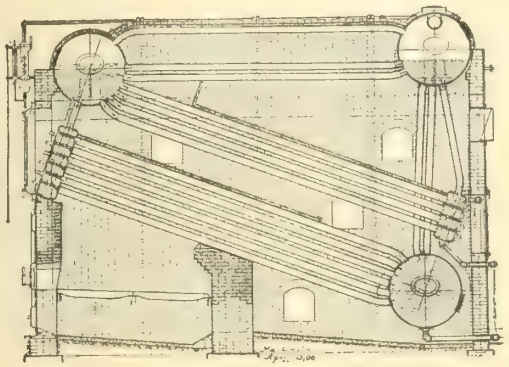
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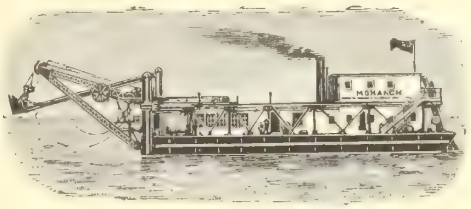
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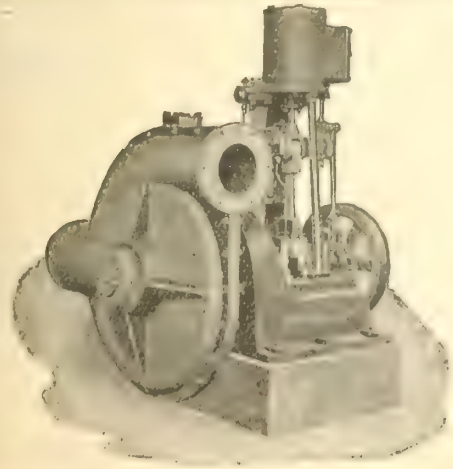
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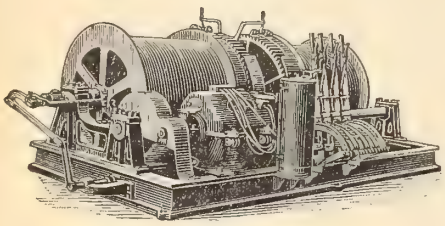
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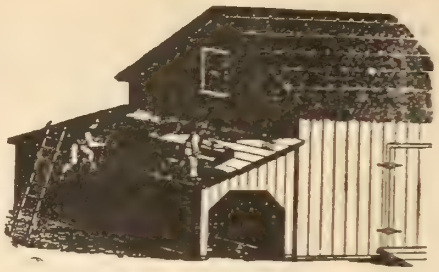


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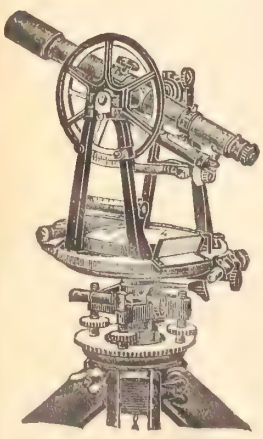
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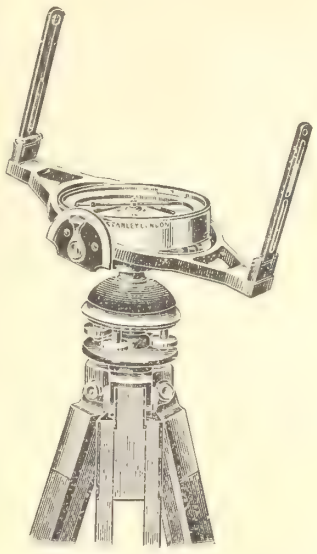
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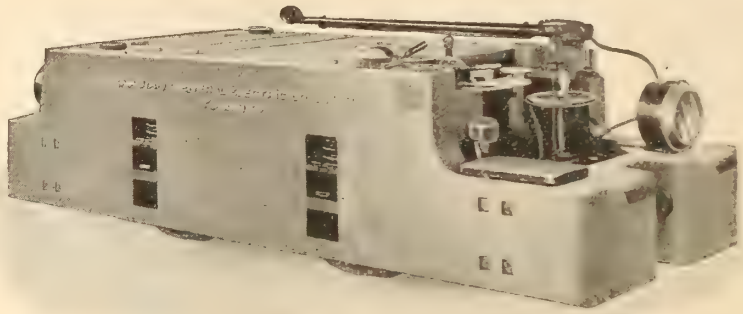
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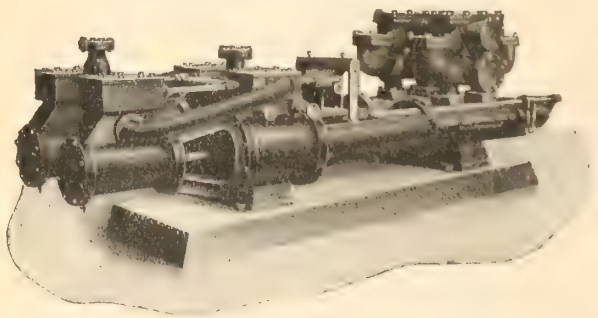
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO and MONTREAL, July 15, 1908 No. 14

The Canadian Mining Journal

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

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COAL AND STEEL.

The president and directors of the Dominion Iron & Steel Company, at the recent annual meeting in Montreal, decided to reject the offer made by the Dominion Coal Company. That offer appeared to us reasonable and generous. In the event of the Dominion Coal Company winning before the Privy Council the Steel Company was to receive $1,250,000.

If the Steel Company won, $2,000,000 would be put in its coffers. The future price of slack coal was fixed at $1.50 per ton and run-of-mine at $1.80.

There is little need of reviewing the history of the struggle between these corporations. Until lately hope of a peaceful settlement has not been abandoned. Popular sympathy was undoubtedly with the Dominion Iron & Steel Company during the first stages of the conflict. Its decisive victories over its formidable antagonist were looked upon by not a few as being in accordance with justice. But in our opinion, there has been a dangerous element of sentimentality in the attitude of the public; and this attitude has not been without its influence upon the decision of the courts.

However, regarding all but the immediate past as a closed book, the fact obtrudes itself that all advances have come from the Dominion Coal Company. Its recent offer of a compromise stands in remarkable contrast to its attitude when the trouble first arose. We do not doubt that its directors, in consenting to make such a proposal to their opponent, have disregarded their personal animus and have sacrificed the interests of their own corporation to an extent that indicates an honest desire for peace. Therefore we mark with regret a certain resolute hostility that characterizes the utterances of the President of the Dominion Iron & Steel Company. The time for this has passed. On both sides sacrifices must be made. A sweeping legal victory for either side might easily resolve itself into an industrial catastrophe.

We have yet to learn what reasonable concession Dominion Steel is willing to make. So far the concessions have come from one side only.

UNFINISHED BUSINESS.

Last March at its annual meeting in Ottawa, two topics of especial importance were discussed by the Canadian Mining Institute, and two resolutions, embodying the sense of the Institute, were passed unanimously.

The former of these resolutions had to do with methods of collecting mining statistics.

The collection of mining statistics is, in itself, beset with many complications and hindrances. There is no law compelling mining or smelting companies to make sworn returns to the statistician of the Federal Department of Mines and that official must rely upon the courtesy of his correspondents.

Operators are under legal obligation, however, to furnish all necessary returns to provincial authorities. At first glance it might be concluded that this is sufficient for all purposes. Such, however, is far from being the case.

For instance, each province has its own method of computing the value of mineral outputs and each differs from the plan followed at Ottawa. Moreover the schedule of questions varies in each case. To add to the difficulties that confound the Dominion statistician, whose task of co-ordinating and standardizing would be a heavy one at best, provincial returns are further complicated by the fact that the official year is not identical in each province. Hence, complete returns are obtained only with disproportionate labor and worry.

The desirability of establishing uniform systems both of evaluation of raw materials, and intermediate and finished products, and also of an agreement whereby throughout the several provinces and at Ottawa, returns may be had in their entirety at the end of the calendar year, needs no argument. At present the apparent discrepancies between provincial and federal statistics is a source of confusion. The Canadian Mining Institute has taken the matter up. It has recommended "that a conference be arranged between the Deputy Minister of Mines and the Deputy Ministers of the Provincial Bureaus to devise, if possible, an uniform method of compiling statistics and valuing mineral products."

The matter must not rest here. By passing the above resolution the Institute recognized officially the need of reform. It has put its hand to the plow and there will be loss of dignity and prestige in failure to carry the movement to a sucessful conclusion.

Another subject, quite different in its bearing from that touched on above, but of at least equal interest, was brought before the Institute by Mr. J. B. Tyrrell. Mr. Tyrrell's resolution, seconded by Dr. T. L. Walker, read as follows: "Resolved—that the Canadian Mining Institute ask the various railways in Canada to issue tickets to prospectors at reduced rates, similar to the tickets now sold to home seekers; the records of such tickets to be endorsed on the Miners' Licenses held by such prospectors." This met the full and hearty approval of the Institute and was passed unanimously. It is a well-conceived and practical means of assisting prospectors, and, hence, a definite step towards opening up new mineral territory.

It is not easy to conceive of two more useful directions of activity for the Canadian Mining Institute than those outlined. Why then is no further action being taken? If the Institute is to fulfil its high mission, if it is to justify the liberal assistance heretofore granted it by Federal and Porvincial Governments, it must accomplish more than mere resolutions. To this end active committees are needed to co-operate with the secretary and council. And, were the members of these committees selected carefully, we have no doubt that the objects of both resolutions would be attained in a surprisingly short time.

CORRELATION OF INTERNATIONAL STRATA.

Mr. Horace F. Evans has recently contributed two articles to the Mining World of Chicago, on the subject of the correlation of international strata. Mr. Evans' treatment of his theme is popular. He sketches the work performed by the International Committee and assumes a judicial attitude in summing up results. By implication and by direct statement he asserts that the Canadian Geological Survey has neglected paleontologic investigation of the older strata of Southern British Columbia. The prediction is made that "exact correlations" of these strata will be accomplished by United States geologists in Northern Washington. "The paleontologist and the paleobotanist cannot expect to find much favor with colonial governments that have 'millions for tribute' but only a few thousands for economic science!"

It is evident from all this (and more that we have neither the time nor the patience to quote) that Mr. Evans has failed to fortify himself with facts. Nor is he conversant with the range and the character of the labors of the Canadian Survey.

The distinguished heads of the Canadian Survey had clear and correct conceptions of correlation. At present the Survey is co-operating with the United States geologists. In British Columbia work was begun long before that country was penetrated by a railway. Ever since that time paleontologic research has been carried on and each year has seen an increasing volume performed.

Dr. Dawson's first efforts were entirely confined to reconnaisance. He then chose certain districts for detailed examination. Where fossils were found successful correlation resulted. In disturbed regions, where the search for fossils was unsuccessful, final correlation was naturally impossible.

Of late the Survey has paid especial attention to the mining districts. Organic remains are not found here. But the investigation of the geologic phenomena of these regions is of prime importance to the province. No one, for instance, can deny the benefits accruing to the mining industry from the Survey's efforts in the Boundary district. But, since fossils are not to be found, why send a paleontologist to search for them? Mr. Evans' position is not sweetly reasonable.

On the other hand the Canadian Survey has seized with avidity any evidence of fossil-bearing strata in British Columbia and has in all cases dispatched paleontologists to hunt and collect over promising ground.

Mr. Evans aspersion on the "Colonial" (meaning "Canadian") Government is torrid atmosphere. The Canadian Geological Survey should, doubtless, be more liberally supported.

But, in proportion to their respective mineral industries, Canada appropriates just three times as much money as does the United States. Moreover, although working on a smaller scale, the Canadian Geological Survey has done incomparably more towards the correlation of international and western strata than has the United States Survey with its large staff and its heavy appropriations. Mr. Evans can hardly ask for more than this. Meanwhile we must thank him for giving us an opportunity to blow our own "National" horn.

DISCOVERY BEFORE LOCATION.

Dr. Raymond's vigorous article in our issue of June 15th has evoked much comment. On another page we print a communication from Mr. W. T. Newman, who concurs almost wholly with Dr. Raymond's position. Mr. Newman condemns the Ontario system of claim inspection as being apt to "lead to grave abuse" and as "an interference of a paternal nature with the search by the public for mineral wealth." He concludes that the vital point is uniformity—one law applying equally to all locations and covering essential revenue and a definite amount of actual exploratory work to be performed annually. Beyond that Mr. Newman's only plea is "let us alone."

It will be appropriate now to hear some voices from Cobalt and beyond. We shall welcome letters from our readers in the bush—from the men who are "up against it."

STANDARDIZATION.

A month ago we reprinted, for the benefit of our readers, the question-forms circulated by the Institution of Mining and Metallurgy. We have been encouraged by a letter from the Secretary of the Institution to urge Canadian mining men to submit answers to these question.

We wish again to request that our readers go carefully over these schedules and send us their opinions for publication. In our next issue we shall publish one set of answers already received.

Standardization is a particularly live and important topic, and it is both courteous and liberal on the part of the Institution of Mining and Metallurgy to offer non-members an opportunity of expressing their opinions.

THE MINING AND METALLURGICAL SOCIETY OF AMERICA.

As the result of vigorous canvassing, discussion and argument, the Mining and Metallurgical Society of America has been launched. Amongst its 114 charter members are many of the most distinguished engineers, metallurgists and geologists on the continent. On the printed list only two Canadian names appear, and these are the only foreign addresses included. Hence the new society is hardly cosmopolitan in its present scope.

That useful body, the American Institute of Mining Engineers, has long been regarded as meeting all the requirements of the mining fraternity. But it has been recognized that the Institute is incapable of performing certain necessary functions. For instance, it cannot take any part in watching and controlling legislation. Nor does membership imply technical attainments or professional standing. But the American Institute of Mining Engineers has exercised a wholesome and uplifting influence upon the mining fraternity of its own and other countries.

Yet more remains to be done. The Mining and Metallurgical Society of America is a strictly professional society. Membership in its is limited to the ranks of the mining and metallurgical engineers, and mining geologists. Whilst a high standard of professional ability and personal character will be insisted upon, yet membership is understood not to be an unqualified endorsement.

One proposal is to print brief records of the professional careers of each member. This thoroughly radical step will no doubt has a beneficent effect.

The five principal fields of activity are briefly as follows:

1. The establishment of local sections, meeting probably once a month, to promote good-fellowship among the members and to exchange views respecting technical and professional matters.

2. The determination of standards in engineering practice, such as is being done by the Institution of Mining and Metallurgy. This is considered a most profitable field of work.

3. The discussion of questions relating to professional practice and ethics, with a view to the gradual formulation of rules for guidance, determined by the concensus of opinion in the Society.

4. The discussion of questions of public policy in which the profession of mining engineering is directly concerned.

5. It is intended that the Mining and Metallurgical Society of America shall be a strictly professional society, etc., etc. This section we have touched upon already.

It will be in the directions defined in sections 3, and 4, that the distinctive work of the new society will lie.

In neither direction will there be serious overlapping of the field honorably occupied by the American Institute of Mining Engineers. In fact, to be useful at all, the Mining and Metallurgical Society of America must avoid duplicating the functions of its older sister. Another and less obvious danger lies in the abuses of power that characterize all close corporations.

Canadian mining men will watch with interest the growth of this fledgling. Meanwhile it is satisfactory to reflect that our own Canadian Mining Institute, whatever its deficiencies, has won its spurs. Its scope is wide enough, and its character sufficiently flexible to enable it to adjust itself to whatever contingencies arise. However, the time may soon be ripe for classification and segregation of its heterogeneous membership. When this is accomplished, Canadians will have the advantage of combining in one society all the advantageous features that mark its several sister organizations.

Editorial Notes.

The Mexican Mining Journal announces that Mr. Kirby Thomas, of Denver, Colo., for some years associate editor of the Mining World has taken full charge of the editorial management of the Journal. Mr. Thomas edited the two special Mexican editions of the Mining World. He is thoroughly familiar with Mexican mining and is well fitted to assume the editorship of our bright contemporary.

The Minister of Finance has given notice of a resolution that will have an important bearing upon the production of petroleum from bituminous shales. It is proposed to provide a bounty of one-half cent per imperial gallon on crude petroleum produced from shales or other substances mined in Canada. This places these products in the same category as petroleum obtained from flowing wells.

DISCOVERY BEFORE LOCATION.

Written for "The Canadian Mining Journal" by W. Thos. Newman.

[Editor's Note.—The following typographical errors occured in Dr. Raymond's article on the subject of "Discovery Before Location." We take this opportunity of making the necessary corrections, so that all ambiguity may be cleared away. Mr. Newman's contribution to the discussion presents a British Columbia point of view.

The errors referred to in Dr. Raymond's paper are:

1. First column of article, third line, the word "solid" should be "valid."
2. Same column, fifteenth line form bottom, the word "location" should be "locators."
3. Second column, third line from bottom of first paragraph, "land" should be "lands."
4. Second column, second line of second paragraph, "indefeasable" should be "indefeasible."
5. Second column, eighth line from bottom, "If he could sell it" should be "If he could not sell it."]

Answering your request for further discussion of the above subject, after reading Dr. Raymond's interesting paper in the last edition of the "Journal," I would remark:

The actual discovery of mineral of commercial value if properly conditioned should be the "sine qua non" of the granting to an individual a portion of the public domain, as it undoubtedly is the one and only inducement for the exploitation of the same and its conversion from a useless portion to one of both public and private value. This is I consider a demonstrable proposition, and therefore the "modus operandi" is the real question at issue. It is acknowledged by all of the men with whom my mining business in British Columbia brings me in contact, that British Columbia titles to lode mining ground are the best in their experience. If the supreme test be that of validity then the very few law suits over titles in this province compared with other countries would seem good evidence of the fact. Clause "28" of the "Mineral Act" quoted below, may also be useful to any seeker after information on the subject of land titles. It is worthy of some thought and reads: "Upon any dispute as to the title of any mineral claim no irregularity happening previous to the date of record of the last certificate of work shall affect the title thereto, and it shall be assumed that up to that date the title to such claim was perfect, except upon suit by the Attorney-General based upon fruad." It is especially significant that there is no precedent for a suit by the Attorney-General under this clause. British Columbia mining titles are absolutely secure.

In, I think, 1898, the writer was on a committee appointed at the request of the Government to suggest any possible alterations to the Mineral Act, and one of the two or three ideas suggested bears very closely on the matter under review. This was "that all applicants for a record of a mineral location should be required to bring into the recorder's office two fair cabinet size samples of the mineral found at his discovery post and make affidavit that the samples were found "in situ' at that point." One of these samples properly labelled was to remain in the local office and the other to be placed in the Museum at Victoria in the Department of Mines. It would seem that such provision should for all time settle the fact of actual discovery or non-discovery on such location. Also the Government would, as pointed out, in a few years have a collection costing nothing, every sample sworn to have come from a given location, and containing such a collection, as it would be impossible to get together in any other manner. Given the above addition to the present mode of staking mineral loca-

tions in British Columbia and the present law would appear about as perfect as it could be made. The Ontario method of having an inspection made by a government official, whether competent or not, is bound to lead to grave abuse and is an interference of a paternal nature with the search by the public for mineral wealth which will not attract the best class of prospectors to what is undoubtedly a rich field and one where the natural difficulties are unusually great, constituting quite sufficient handicap to the individual prospector who is the real explorer and on whom the province must perforce rely, if the "back of beyond" is to become the real producer of wealth in that great country. The last recommendation in that committee's report was "let us alone" and this to-day is perhaps the greatest need of most countries where adequate mining laws are in force. It is true that there are some countries on this continent still which have never had any real mining laws. With arguments in the able paper quoted by Dr. Raymond other than the doubt as to "bona fide" discovery being a good thing, I am in full accord. Allow any man or men to take up just as many claims as the annual assessment is faithfully performed upon and no more, and both the prospector and the capitalist will have ample opportunity to secure whatever they may deem desirable. The one point is—uniformity. Have one law applying equally to all locations covering essential revenue and a certain amount of real exploring of the ground annually and then "let us alone."

VALUATION OF MINING PROPERTIES.

By George H. Gillespie, M.E.

The valuation of mining properties for operation and profit earning should always be looked upon from a commercial point of view. The engineer or valuer must, therefore, always keep before him this question: If I buy this mining propery for a given price, spend a certain sum on plant, development and equipment, will the probable output from this mine return such expenditures, plus a reasonable return on capital so expended, commensurate with the risk undergone?

It is not claimed or expected that all mining properties can or should be purchased as certainties. The purchase price of a speculative venture should surely, however, bear some reasonable relation to the possible profit to be earned from successful operation.

Great stress is often laid upon the phenomenal success resulting from the operation of certain properties, properties that at earlier stages may have shown or (more correctly) it may have been claimed that they showed little or no evidence of their great productive future. It is again often claimed, usually by interested parties, that many good properties have been turned down by the trained valuer, which later on made good. It is certain that the trained and experienced observer does make mistakes, but it is equally certain that he makes fewer mistakes than the untrained man.

The critic of the trained mining valuer, when he cites the case of the mine that made good after it had been turned down by the valuer, usually omits to mention, and is often ignorant of, the reasons on which the opinion had been based. It may be that the property was worth a price, but not the price at which it was open for consideration. Many reasons might be given to show why a property turned down at one time might later on, under changed conditions, become valuable.

The problems of mine valuation may be divided roughly into two classes: (1) Mining prospects on which no work of determinative ore blocking has been done, butw ork of a merely indicative nature. (2) Mining properties on which actual ore reserves have been blocked out, the ideal case being a mine which has a past, a present, and a future, viz., past production, actual present operation, and the certainty of future profitable or positive ore reserves.

The valuation of the first class of mining properties is attended by a great deal of risk. The risk may be minimized by comparison with similar conditions, known to exist elsewhere. Should the prospect be situated in a district that has had large development of similar claims, great aid may be derived from a consideration of conditions found at various stages of development in such claims, and comparison with conditions at similar stages found in the prospect to be valued. That is, the study of the mining history of any given district should prove of positive assistance to the valuer.

The highest probable value of any mining prospect in a given district may be approximately stated to be the average value of successes in that district, successes being taken to mean such mines as may have been actually worked as paying propositions. Exceptions will, of course, be found to a general rule such as this. Mines vary in value, as do other things. There will always be the best and the worst mine. However, as a basis of valuation a rule such as this should prove valuable. If a district is a new one, or an old district in which little or no great success has been met with in actual practice, even should indications on a given claim appear to be exceptional, a small valuation would be justified.

The valuer must be willing to take a fair risk, his duty being to look for merit and business opportunity, not simply to condemn.

The valuation of producing mining properties is the problem that comes more nearly into the province of true engineering. In a producing mine data can be collected which when correlated should give a foundation for actual calculation of values.

I shall divide producing properties into two classes, based upon the nature of the valuable contents of the ores: (1) Ore values that are not subject to market fluctuations, such as gold. (2) Ore values that are subject to market fluctuations, such as silver, copper, lead, etc.

It must be manifest that a property whose payable probabilities are based on ores of metals whose selling price fluctuates over a wide range must be valued on the average probable price of such metals during a reasonable assumed lifetime of the property.

The engineer is therefore called upon not merely to value from a geological standpoint, but he must consider the commercial and metallurgical factors. By his knowledge of geological and mining conditions, he

can arrive at his estimate of the lifetime of the mine, and by his commercial and metallurgical knowledge at the value of the mine.

He must be able to estimate the ore actually in sight by the usual methods of sampling, and he should be able to cost the ore through to the market. The value of an ore to a mining company is that profit, if any, that can be earned from mining and treating the ore, and marketing the product of these operations.

The question confronting the mine valuer or buyer is the usual commercial one faced by the buyer of dry goods or other merchandise: What is the fair price to me, that is the price at which I can buy, operate, and make a profit? And mining differs from no other business in that the object of conducting mining operations is the earning of profit. If the initial mistake of paying too much for the property is made, then the venture is foredoomed to failure. A mine has an absolute value. It may be difficult to determine that value at the early stages of operation; but the value is, however, absolute, no matter how obscured.

The ore reserves in mines other than gold mines, that had been valued on market values of a year ago, would, on the same ore reserves be to-day worth as a result of market fluctuations about 20 per cent. less. In addition to this direct result of the falling prices of metals, a mine's value is affected in another way. The falling prices of metals mean that the market is less able to buy, and that a mine will therefore probably be forced to reduce materially its output on account of the inability of the market to take care of such output.

Should the financial condition of the mine warrant it, during low markets, to prevent over-production of metals, it might well be that the cheapest storage of metal is in the stopes of the mines as unbroken ore. Initial over-capitalization and over-valuation may force production and operation at periods of low-priced metals, when it had been better policy to have temporarily suspended or reduced operations. A mine really contains just so many ounces, pounds, or tons of valuable contents, and when these are sold at low figures there is just so much less to sell at the high figures. In largely developed mines production averages may be maintained by working low grade ores during high priced metal markets, and high grade ores during low priced markets.

The valuer of a mine is faced with that distinctive feature of mining, the fact that the miner destroys his assets to earn his profits. Each ton of ore produced is one ton nearer the working out of the mine, and a ton that cannot be replaced. That is, in a given area there is a certain quantity of ore—that, and no more. Therefore capital investment must be based upon the return of this capital in the period of time in which this ore body will be exhausted. Dividends from a mine are rarely income, but must be looked upon as being income plus redemption of capital. The lifetime of a mine is therefore an important factor of mine valuation.

The costing of mining operations for valuation of ore reserves can only be done by a man familiar with actual mining operations. The cost per ton is often stated as a figure that looks reasonable. If one takes the result of a year's operation on a mining property, multiplies the tonnage by the tabulated costs per ton, and subtracts the product from the gross value of the ouput, the result would appear to be the profit per ton. However, the actual net profits are very different, and are always much less. One is therefore forced to the conclusion that the actual cost per ton is the difference between actual profits and gross value of the ore, and that tabulated results obtained from many cost systems are merely book-keeping. In my opinion the only true basis for tabulating comparative costs for valuation of ore reserves is the cost of production of unit in values in the ore, say the ounce for gold and silver taken as refined, or the pound for copper, the total cost per unit being the actual cost to market, the profit per unit being that profit earned after total cost has been deducted.

The advance of the cost per unit of value as against cost per ton of crude may be illustrated in the valuing of gold mines. I will take the case of small vein as against a large ore body.

I will suppose that the character of ore in both cases is similar. Costs stated are arbitrary, but the ratio of operative costs is fair.

Small vein, 2 feet, 1 oz. per ton gold values.
Large vein, 30 feet, $3 per ton gold values.
1 ton, 2 foot vein = 1 oz.
7 tons, 30 foot vein = 1 oz.
Cost per ton, 2 foot vein = $10 per ton, mining, milling, etc.
Cost per ton, 30 foot vein, = $2 per ton, mining, milling, etc.
Cost, per oz., 2 foot vein = $10 per oz.
Cost per oz., 30 foot vein = $14 per oz.
Profit per oz., 2 foot vein, $10 per oz.
Profit per oz., 30 foot vein, $6.

The two foot vein, 1 oz. per ton, proposition would call for a small initial installation of plant, say 20 stamps, with corresponding equipment and development. The 30 foot ore body, $3 per ton, would require a comparatively large installation, say 100 to 200 stamps, with proportionate equipment and development, involving a large initial expenditure of capital; the 2 foot vein gives good returns on small initial expenditures. The 30 foot low grade ore body means a large initial expenditure and large scale of operations before any corresponding return can be looked for. The scale of operation of a property is, therefore, an essential factor in its valuation.

Each class of mining venture is a good one, provided it embodies the necessary features for successful operation called for by the limitations of its class.

The small body can be more easily valued; the larger body calls for a careful preliminary sampling, first by ordinary methods of hand sampling, later by operation on a small scale. Successful operations of large low grade ore bodies are more often the result of careful evolution in mining and treatment practice over long periods of time, than the endeavor to earn profits on economies at the start of operations. The ideal conditions for a future large low grade producer are the existence of fair quantities of good grade ore associated with large quantities of low grade ore. The mine can be opened up on the high grades, on a small scale, the initial mistakes made on a small scale, and on a grade of ore that can best afford to pay for such mistakes. Gradually the scale of operations can be extended to that point where the largest quantity of ore of lowest payable grade can be worked. It is always a dangerous method to endeavor to create large operations where there is nothing but low grade ore.

(To be continued)

A SCHOOL FOR RESCUE WORK IN COAL MINES.

"The Canadian Mining Journal" has given prominence to articles on rescue work in coal mines. The vital necessity of properly equipped stations and of facilities for instructing miners in the use of breathing apparatus may be emphasized at any moment by shocking calamities. In all Canada there is only one station where breathing apparatus is kept in readiness for emergencies and where men are trained to meet these emergencies. That station was built and equipped at Glace Bay, Nova Scotia, by the Dominion Coal Com-



"AEROLITH" APPARATUS.



DOCTOR EXAMINING TEAM BEFORE ENTERING THE MINE.



THE WEG APPARATUS, SHOWING CYLINDER.



THE WEG APPARATUS, FRONT VIEW.



CYCLE AMBULANCE.



SIMONS' AMBULANCE CYCLE. It can be fitted as an ambulance in three minutes.

pany. Not only is it the sole establishment in Canada, but, strange to relate, there is no other in all Amreica.

At Glace Bay the Draegar apparatus is in use. We reproduce here another type of apparatus, the "Aerolith."

At Atherton, Lancashire, England, an elaborate model mine has been constructed by the Lancashire & Cheshire Coal Owners' Association. Here novices are trained to meet and overcome the difficulties and obstruction that might be expected after an explosion in an actual mine. The galleries are obstructed and the workings are filled with smoke and sulphuretted hydrogen. In these galleries competing parties of miners set up ventilation walls, remove debris, carry dummies and perform all the duties that they would be called upon to meet in times of real danger. Judges watch the competitors through glass partitions.

The photographs here reproduced are of particular interest. It is not too much to say that our larger mining schools should add a practical course in the use of breathing apparatus to their curricula. No colliery manager's education should be considered complete if it does not include a working knowledge of this subject.

REPORTS OF BRITISH MINES INSPECTORS FOR 1907.

Cardiff District.

The Mines Inspector's report states that 96,265 persons were employed above and below ground at the mines during 1907. Thirteen thousand six hundred and thirty-four of this number were employed overground. The improved price of coal brought about three increases in the miners' wages, which now stand at the maximum of 60 per cent. above the standard of 1879. Twenty-four million six hundred and twenty-five thousand seven hundred and twenty tons of coal, 44,166 tons of fireclay, and 8,195 tons of ironstone were raised. Taking all these into the calculation, 298.6 tons of mineral were raised for each person employed below ground. For each person employed above and below ground, 256.3 tons were raised. The production per person was lower than in any previous year.

One hundred and sixteen thousand four hundred and eighty-four tons of coal were produced by coal cutting machines, whilst in the previous year only 64,135 tons were won by this means. In two cases narrow seams, unworkable by hand, were worked successfully by machines. A total of 17 machines was used, 3 driven by electricity, 14 by compressed air. Ten of these were bar machines, three percussion, three disc, and one chain.

The number of deaths due to accidents amounted to 138. Falls of roof or wall were responsible for 65 deaths; miscellaneous underground accidents, for 50 deaths. In addition to this, 259 persons were injured in the former class of accidents and 210 in the latter. The death rate from accidents per 1,000 persons employed below ground was 1.524, as compared with 1.730 for the year 1906. Tons of mineral raised per life lost amounted to 178,835. In 1906 the figure was 159,879 tons per life lost.

The explosive most commonly used was Saxonite, of which 240,587 pounds were consumed. Out of the total estimated number of shots fired, 964,052, a large proportion, 902,640, were fired by electricity. These figures included only permitted explosives. Gelignite and gunpowder, not on the list, were used to the extent of 120,499 pounds.

In the Cardiff District 89,938 safety lamps were in use. The lead rivet method of locking was used in 52,064 of these lamps and the magnetic on 29,775. The Clanny lamp (shielded, one gauze) constituted a large proportion of the total—84,689.

Swansea District.

As in Cardiff, the relations between employers and employed were uniformly pleasnt throughout the year. In neither district was there any serious stoppage of work due to friction between operators and miners.

At 292 coal mines, 47,179 persons were employed, an increase over 1906 of 5,813. Overground there were 8,459 persons, underground 38,120 persons employed. Twelve million one hundred and fifty-six thousand seven hundred and eighty-eight tons of coal were raised, an average of 1,101,687 tons over 1906. The output of anthracite was 3,498,258 tons, 456,042 tons greater than the previous year's figure.

Forty-nine thousand and seventy-six tons of coal were won by coal cutting machines, as compared with 12,113 tons in 1906. Eleven machines were used, six of which were bar machines. Six were actuated by electricity, five by compressed air.

The deaths from accidents numbered 110, as against 74 in the year preceding. This large increase was due to explosions of firedamp or coal dust, falls of roof and sides, and miscellaneous accidents. The mines were worked under extraordinary pressure. The large number of non-fatal accidents, 458, may be explained by the fact that the new act has the effect of inducing managers to report accidents of a very slight character. Out of the 110 deaths, 42 were attributable to falls of roof or sides. The death rate from accidents underground was 2.66 per 1,000 persons employed.

Saxonite (290,029 pounds) was the most widely used explosive, with Bobbinite (177,084 pounds) second. Gunpowder had 378,892 pounds to its credit, but is not included in the permitted list. Seven hundred and seventy-one thousand and thirty-seven shots out of 1,579,439, were fired by electricity.

The Cambrian (Clanny type) safety lamp is in use more than any other type. The total number of lamps is 26,310, and of these the Cambrian numbers 16,525. 95.5 per cent. of the safety lamps are locked by methods other than the screw method. With the exception of the Protector (6,028 in use) and the Ackroyd and Best (2,445 in use), which are relighted by electricity, the lamps are relighted at lamp station by the exposure of a naked lamp.

NEW MEMBERS CANADIAN MINING INSTITUTE.

The following gentlemen have been elected members or associate members since the annual meeting, March, 1908:

March 3rd, Members—Manley B. Baker, School of Mining, Kingston, Ont.; John Chas. Dufresne, Riondel, B.C.; Geo. Gillespie, 411 Continental Life Bldg., Toronto, Ont.; A. Heathcote, Inspector Mines, Lethbridge, Alta.; Norman L. Leach, Moose Mountain Ltd., Sudbury, Ont. Associates—D. A. Brebner, 1428 Traders Bank Bldg., Toronto, Ont.; J. E. Cook, Temple Bldg., Toronto, Ont.; Jas. McGregor, Latchford, Ont.

March 7th, Members—Thos. Travers, Sudbury, Ont.; J. E. Woodman, D.Sc., Dalhousie University, Halifax, N.S. Associate—Wm. C. Chambers, Harriston, Ont.

April 1st, Members—James Anderson, Ruth Mines, Box 122, Kaslo, B.C.; S. R. Heakes, Supt. Kerr Lake Mining Company, Cobalt, Ont.; J. H. Hubbell, manager Silver Bar Mining Company, Cobalt, Ont.; Lieut.-Col. H. H. Williams, C.E., general manager Broughton Asbestos Fibre Company, East Broughton Station, Que. Associates—Frank L. Cody, managing director Cleveland Cobalt Silver Mines, Limited, Box 179, Cobalt, Ont.; Herman H. Lang, mine manager, Cobalt, Ont.; J. Lorne McDougall, jr., Haileybury, Ont.; A. J. McMillan, general manager Le Roi Mining Company, Limited, Rossland, B.C.; Robert Meredith, Box 722, Montreal, Que.; Clive Pringle, Ottawa, Ont.; Arthur Ross, Box 1122, Montreal, Que.; Geo. E. Sancton, Box 136, Cobalt, Ont. Student—B. Neilly, Bradford, Ont..

May 2nd, Members—H. S. Badger, M.E., Richardson Mines, N.S.; J. W. Bryant, M.E., Box 665, Victoria, B.C.; J. T. Fee, M.E., Cobalt, Ont.; Geo. L. Fraser, mine superintendent, Coleman, Alta.; B. W. Leyson, Cobalt, Ont.; G. F. McNaughton, Cobalt, Ont.; A. H. Sancton, M.E., care Mussens, Limited, Cobalt, Ont.; Bert N. Sharp, M.E., Orient, Wash, U.S.A.; Robt. Turnbull, C.E., 23 Luke street, St. Catharines, Ont.; C. G. Williams, M.E., Cobalt, Ont. Associates—L. O. Armstrong, 221 Milton street, Montreal, Que.; Spencer Benerman, Midway, B. C.; C. L. Campbell, Box 85, Cobalt, Ont.; W. Teese Curran, mine owner, 300 St. James street, Montreal, Que.; E. L. Doucette, Room 53, 112 St. James street, Montreal, Que.; G. A. MacPherson, M.E., Niagara Falls; D. B. Rochester, Cobalt, Ont.; Robt. T. Walker, Cobalt, Ont.

June 28th, Members—Lyndon K. Armstrong, M.E., Spokane, Wash., U.S.A.; C. V. Brennan, B.Sc., Summerside, P. E. I.; G. H. Corbet, M.E., Phoenix, B.C.; Geo. H. Dickson, M.E., Coleman, Alta.; Dr. B. E. Fernow, University of Toronto, Toronto, Ont.; A. G. Larson, superintendent Le Roi Mining Company, Limited, Rossland, B.C.; Fred. S. Peters, Le Roi Mine, Mossland, B.C. Associates—L. C. Butler, president Slipp-Butler Company, 52 Wall street, New York, N.Y., U. S. A.; W. J. Hamilton, Deloro, Ont.; Arthur P. Naismith, Cobalt, Ont.; Samuel Price, St. Thomas, Ont.; Gordon McI. Pyke, Box 893 Montreal, Que.; W. S. Rugh, Le Roi Mining Company, Limited, Rossland, B.C.; R. P. Williams, Rossland, B.C.

Notes on Reports and Maps of Special Economic Interest, Published by the Geological Survey Branch of the Department of Mines.

Economic Geology of Nanaimo and New Westminster Districts, B.C. (issued June, 1908).—Preliminary report on a portion of the main coast of British Columbia and adjacent islands, included in the New Westminster and Nanaimo districts, by O. E. Leroy. This report, while only preliminary, gives a fund of information respecting the economic geology of a portion of British Columbia which, though only partially examined, has already given evidence of being rich in mineral wealth, as well as possessed of immense timber resources, with water power available for their development. Gold, silver, copper, iron, zinc, structural stone in great variety, and clays—some of a very fine, pure character—are all found in abundance, as well as other minerals of lesser importance. An excellent map is incorporated in the report, thus adding practical importance to this publication.

Coal on the Telkwa River, B.C. (issued May, 1908)—A report on the Telkwa river and vicinity, by W. W. Leach, issued by the Geological Survey Branch of the Department of Mines, is of interest from the fact that extensive bodies of coal are known to exist along that river, and its tributary streams, which will be rendered accessible by the construction of the Grand Trunk Pacific Railway. At present, the only means of communication is by pack train; but as soon as the coast section of the Transcontinental Railway is opened, the coal can be shipped direct from the mines to tide water. The country has been only roughly prospected, but many mineral claims have already been staked, and much of the available arable and timber land taken up. A map accompanies the report.

Gold Near Lake Megantic, Que. (Issued June, 1908).—The report of John A. Dresser, on the recently discovery of gold, near Lake Megantic, Quebec, issued by the Geological Survey Branch of the Department of Mines, recalls the fact that alluvial gold was successfully mined for many years on tributaries of the Chaudiere river, which flows out of Lake Megantic. The present discovery is near Victoria river, which empties into the lake. Three separate dikes have been located, in which quartz, carrying small grains of gold, is found. A considerable number of licenses have been taken up along the Victoria river, in the hope that alluvial gold may be found. An assay of a sample taken from one of the dikes shows, in addition to gold ,a small silver value. The report is accompanied by a map.

Tertiary Plants of British Columbia. (Issued 1908).—This is a monograph on the tertiary plants, found in the lignites of British Columbia, and other portions of Western Canada, the material for which was collected by L. M. Lambe, in 1906, the determination of species having been made by Professor Penhallow, D.Sc., F. G. S. A., of McGill University, Montreal. Although much has been accomplished in determining the age of the tertiary deposits, it is still an open question as to the precise horizons within which they fall, and the number of successive stages represented in the tertiary as a whole. The studies contained in this report will help to clear up some of the questions about which there is difference of opinion; and the report brings together, in readily accessible form, a mass of material hitherto scattered and fragmentary.

Report on a Portion of Northwestern Ontario Traversed by the National Transcontinental Railway, Between Lake Nipigon and Sturgeon Lake. (Issued 1908)—The National Transcontinental Railway, now under construction, will open up and render accessible much

territory of which little has hitherto been known. This report describes a district to the north of Lake Superior, which the explorations made by the author—W. H. Collins—show to be possessed of considerable economic value. Gold and iron are the principal minerals—so far as known—and some development work has been done, though not to any great extent. This region, owing to its geological peculiarities, has many lakes and water courses, and water powers exist in every direction. Areas of arable land are to be found, together with an abundance of timber for firewood, and mining purposes. A map, geologically colored, showing the features of the district, accompanies the report.

Moose Mountain District of Southern Alberta. (Issued 1907)—The Moose Mountain district, in Southern Alberta, is rich in coal, and natural gas, and its frequent accompaniment, oil, are also found. This report, of investigations made by D. D. Cairnes, B.Sc., M.E., contains full information respecting the geology of the area, and the economic minerals it contains; with lists of the fossils and the flora there found. A map goes with the report.

Geological and Topographical Map of a Portion of Conrad and Whitehorse Mining District, Yukon Territory. (Issued 1908)—Considerable activity has been going on in the development of the district shown on this map, now rendered easy of access by means of the White Horse & Yukon Railway. The map shows the geological formation, topographical features and mining claims of the district. It has been prepared to accompany a report of D. D. Cairnes, B.Sc., M.E.

Elmsdale Sheet, Hants and Halifax Counties, Nova Scotia. (Issued 1908)—This map shows, in detail, all the features of this portion of the gold-bearing area of Nova Scotia. In addition to the map there is also a section indicating the respective rock formations. The map includes the Renfrew, Mount Uniacke, and Oldham gold districts.

Geological Map Showing Coal Areas in Alberta, Saskatchewan and Manitoba. (Issued 1907)—The coal supply for the western provinces is an economic question of great importance. This map, showing the coal areas, has been prepared to accompany a report by D. B. Dowling, B.A.Sc., and will be of great service in this important matter.

Map of the Auriferous Gravels on Bonanza and Hunker Creeks, Klondike Mining District, Yukon Territory. (Issued 1908)—This map has been prepared to accompany a report by R. G. McConnell, M.A., and conveys much information respecting a district to which much attention has been directed recently, on account of its rich gold mines.

Plan and Sections of the Brookfield Gold District, Queens County, Nova Scotia. (Issued 1908)—This plan, prepared by E. R. Faribault, B.A.Sc., shows one of the gold districts of Nova Scotia, which has yielded considerable quantities of the precious metal.

New Topographical Map of Rossland District, B.C.—Special map of Rossland, B.C., by W. H. Boyd. This map—issued June, 1908—shows the topography of the city and the adjacent mining districts, with contour lines, and details, which cannot fail to be of great service to anyone interested in the development of this important mining centre.

GEOLOGICAL SURVEY PARTIES.

The interim supply bill passed last week has enabled the Geological Survey to get another group of parties into the field.

Mr. W. McInnes has left for South Indian Lake and the Churchill River. The possibility of this country being opened up by the Hudson's Bay Railway in the near future is attracting attention to this region. The upper and lower portions of the Churchill River have already been explored by the Geological Survey. Mr. McInnes will endeavor to fill in the gap now existing. He will try to get in by one route and return by another, to secure additional information as to the geological boundaries, and to examine reported coal and copper occurrences north of Prince Albert.

Mr. W. H. Collins has left for the Montreal River to study the economic geology of the region near its headwaters. The lower portion of the river received a good deal of attention last year from prospectors and promising discoveries were made. The upper portion of the river needs exploring.

Mr. W. A. Johnson has left for Simcoe, Ontario, to continue his topographical and geological work in this sheet covering this portion of the province.

Mr. M. E. Wilson has left for the district north of Lake Temiskaming, in the Province of Quebec. Prospecting for gold is going on in the neighborhood of Lake Opisatica and northeast from Larder Lake on the Quebec side.

Mr. J. A. Fraser is leaving to conduct a geological survey along the line of the national transcontinental from Quebec to the Quebec-New Brunswick interprovincial line.

Mr. G. A. Young has taken a party to New Brunswick to make a detailed survey of a geological sheet covering the iron range near Bathurst.

Mr. R. W. Ells has a party at work in Albert County mapping the oil shales which he will investigate as to their extent and their possibilities in producing petroleum. Dr. Ells is a present in Scotland for the Department of Mines, investigating the oil shale industry in the old country, where for many years it has been successfully conducted.

Mr. E. R. Faribault will be leaving Thursday for Nova Scotia to continue his mapping of the gold-bearing rocks of this province.

Mr. Hugh Fletcher will spend the field season in Cumberland County, Nova Scotia.

Experiments show that while the sedimentary rocks may absorb several per cent. of their volume of water—sandstones 15 per cent., limestones, 5 per cent. and shales 4 per cent.—granites and crystalline rocks seldom absorb more than one-half of one per cent. of their volume, and until within a few years it was thought to be absurd to sink a well in the harder rocks. Frederick G. Clapp, of the United States Geological Survey, has now reported that about 87 per cent. of the wells in granite in southern Maine supply water enough for domestic use. Water percolates very slowly through the rock but more sinks into the vertical joints, and a moderate quantity is stored in the horizontal joints and crevices down to a depth of 200 feet, the amount being so limited that only two out of 72 successful wells yielded more than 50 gallons per minute. The wells are drilled only in the surface rocks, two-thirds being not over 100 feet deep.

THE CANADIAN MINING INSTITUTE SUMMER EXCURSION, 1908.

As previously announced, the Summer Excursion of the Institute will start from Quebec on August 24th.

The itinerary of the tour is as follows, subject to necessary revision en route:

STAGE I.

Monday, Aug. 24th.—Members will assemble at the Chateau Frontenac in the city of Quebec. Visits will be made to the Island of Orleans and other points of interest. The train will leave for Sydney, N.S., late in the evening.

Wednesday, Aug. 26th.—Arrive at Sydney, N.S. (N.B. All arrangements in connection with Nova Scotia visit have been kindly undertaken by the Mining Society of Nova Scotia.)

Thursday, Aug. 27th.—Visit to the Dominion Iron & Steel Company's work.

Friday, Aug. 28th.—Visit to the Dominion Coal Company's collieries, etc. Banquet at Sydney. Late in the evening the train will leavef or Stellarton.

Saturday, Aug. 29th.—The day will be spent in visiting the Acadia Coal Company's colliery at Stellarton. The train will leave the same evening for Sherbrooke, via St. John.

Monday, Aug. 31st.—Upon arrival at Sherbrooke early in the morning, the party will go by the Quebec Central Railway to Thetford, Que., where the day will be spent in visiting the asbestos mines in the neighborhood, and the Canadian Chrome Company's works at Black Lake.

Tuesday, Sept. 1st.—Arrive in Montreal about midday.

Wednesday, Sept. 2nd.—Excursions will be arranged and a reception given by the Local Committee. Leave for Toronto in the evening.

STAGE II.

Ontario Excursion.

Thursday, Sept. 3rd.—Arrive in Toronto in the morning and proceed at once to Niagara Falls, by steamer across Lake Ontario to Lewiston, and thence by Gorge Railway to the Falls, where the day will be spent.

Friday, Sept. 4th.—Leave Niagara. The day will be spent in Toronto, where the party will be the guests of the directors of the Toronto National Exhibition. The train will leave in the evening for North Bay and Cobalt.

Saturday, Sept. 5th.—Arrive at Cobalt early in the morning. The principal mines of the district will be visited, the arrangements being in the hands of the Cobalt Branch of the Institute.

Sunday, Sept. 6th.—Leave Cobalt and arrive Sudbury.

Monday, Sept. 7th.—A visit will be paid to the Moose Mountain iron mine.

Tuesday, Sept. 8th.—Arrive at Copper Cliff. The party will be the guests of the International Nickel Company, whose smelter and Creighton mine will be visited. The company has also kindly undertaken to provide a camp luncheon. Leave Sudbury at midnight.

STAGE III.

Alberta and British Columbia Excursion.

(N.B. The following programme is subject to minor alterations at the discretion of the Local Committees in charge of the entertainment arrangements at the different localities to be visited).

Thursday, Sept. 10th.—Arrive Winnipeg 9.45 a.m. Leave Winnipeg 11.20 a.m.

Friday, Sept. 11th.—Arrive Medicine Hat in the morning, and visit natural gas wells. Leave by special train for Lethbridge, where the afternoon will be spent at the colliery of the Alberta Railway and Irrigation Company.

Saturday, Sept. 12th.—Arrive in Frank early in the morning, where a short stop will be made to enable the party to see the landslide and coal mine. Arrive before noon at Coleman, where the remainder of the day will be spent in inspecting the mines and plant of the International Coal & Coke Company. Special side excursions to Lille, Hillcrest and Bellevue collieries may be arranged by the Local Committee (the Lille mines are equipped with a new power and coal washing plant and the only set of Belgium ovens in the West).

Sunday, Sept. 13th.—Leave Coleman early in the morning, arriving at Hosmer about 9 o'clock. A short stay will be made here to enable the party to inspect the extensive and thoroughly modern colliery established at this point by the C. P. R. After arriving at Fernie early in the afternoon, the train will immediately leave for a visit to the mines at Coal Creek. Leave Fernie at midnight for Moyie.

Monday, Sept. 14th.—The train will arrive at Moyie at 6 a.m., and the morning will be spent in inspecting the St. Eugene (the largest silver-lead mine in Canada) and concentrator. The train will leave at midday to connect with the steamer leaving Kootenay Landing, and arriving at Nelson at 7 p.m.

Tuesday, Sept. 15th.—Leave Nelson at 6.30 a.m. by special train, and arrive at Smelter Junction at 8.30 a.m. Here the party will be permitted to inspect the well-equipped smelter and refinery plant of the Consolidated Mining & Smelting Company of Canada, Limited. The remainder of the day will be spent at Rossland and visits will be made to the Le Roi, Le Roi 2, Centre Star and War Eagle mines.

Wednesday, Sept. 16th.—A special train will leave Trail for Greenwood, arriving at 1 p.m., where arrangements will be made for visiting the very complete copper smelting works of the British Columbia Copper Company, the Mother Lode mine and the smelter at Boundary Falls, owned by the Dominion Copper Company.

Thursday, Sept. 17th.—Special train will leave Greenwood early in the morning for Phoenix, where several hours will be spent in visiting the important mines, including those of the Granby Company, the Brooklyn mine, owned by the Dominion Copper Company, and the Snow Shoe, operated under lease by the Consolidated Mining & Smelting Company of Canada, Limited. In the afternoon the important smelting works of the

Granby Company at Grand Forks will be visited. At midnight a special train will leave for Nelson.

Friday, Sept. 18th.—The day will be spent at Nelson, and arrangements will probably be made for a visit to the Bonnington Falls power plant at Bonnington Falls. At midnight the train will leave to connect with the steamer, which will take the party across the Arrow Lakes to Arrowhead. Arrive at Revelstoke in the evening.

Sunday, Sept. 20th.—Arrive at Victoria in the evening. Three days will be spent in Victoria and excursion will be arranged and a reception given by the Local Committee.

Thursday, Sept. 24th.—Arrive at Vancouver in the morning and visit Stanley Park, leaving by the eastbound train for Banff in the afternoon.

Friday, Sept. 25th.—Arrive at Banff at night.

Saturday, Sept. 26th.—Visit Bankhead Collieries near Banff. Entertainment at luncheon or dinner by the Government of Alberta.

Thursday, Oct. 1st.—Arrive Montreal.

Railway Rates, Eetc.

The railway companies having generously agreed to accord a special rate of half single fare each way via the route travelled, the transportation charges will be approximately as follows:

Nova Scotia—Quebec Excursion (Quebec to Sydney, $9.25; Sydney to Sherbrooke, $7.35; Sherbrooke to Thetford, $1.15; Thetford to Montreal via Sherbrooke, $2.75). Total, $20.50.

Ontario Excursion (Montreal to Toronto, $5; Toronto to Niagara and return, going steamer, returning rail, $2.85; Toronto to Cobalt, $4.95; Cobalt to Sudbury, $2.75; Sudbury to Toronto, $3.80; Sudbury to Montreal, $6.30). Total, Montreal to Sudbury and return, $21.85.

Alberta—British Columbia Excursion (Montreal or Toronto or North Bay to Rossland via the Crow's Nest Pass, Rossland to Greenwood, Greenwood to Nelson, Nelson to Victoria, Victoria to Montreal) $76.85.

(N.B. The approximate rate specified for Stage III. includes the specified rates for Stage II, except the Niagara and Cobalt parts of that Stage.

Sleeping cars will be engaged for the entire trip, and those taking part in the excursion will be required to deposit with the Treasurer an amount covering the charges for the accommodation they desire reserved for each stage. The charge for berths will be as follows:

Nova Scotia-Quebec Excursion, $18.

Ontario Excursion, $15.

Alberta-British Columbia Excursion, (from North Bay), $70.

The Institute will have its own dining car service, and members of the party will be charged at the rate of $3 per day for meals, payable in advance for each stage of the excursion.

In order to secure train accommodation, applications must be received by the Secretary not later than July 15th. After that date the list will be closed and accommodation will not be guaranteed. Applications must be accompanied by deposits subject to forfeiture) as follows:

For the Nova Scotia-Quebec trip a deposit of $25 will be required.

For the Ontario trip a deposit of $25.

For the Alberta-British Columbia trip, $75.

Or for the whole excursion, a deposit of $125.

Berths will be allotted as applications are received.

Railway tickets will be issued by the Secretary before the departure upon each stage of the excursion.

Persons joining the train locally are reminded that they cannot be insured sleeping car accommodation unless they have previously arranged therefor with the Secretary.

H. MORTIMER-LAMB.
Secretary.

PROGRESS WITH THE GRONDAL PROCESS OF CONCENTRATING AND BRIQUETTING IRON ORES.

By P. McN. Bennie, Fitzgerald & Bennie Laboratories, Niagara Falls.

Ottawa Meeting Canadian Mining Institute, March, 1908.

The growth of an art is reflected in the broadening meaning of its definitions. Mining and metallurgy are twin arts so closely related that it is hardly conceivable how they could have had other than simultaneous birth. Mining might be more broadly defined as the art of getting minerals and ores out of the earth, while metallurgy is the art of getting metals out of ores. They make mutual demands upon each other, as, for example, when mining discloses the nickel-cobalt arsenides of the Cobalt district, the ores are laid at the door of metallurgy, with the announcement "There's something new for you, get those things out for us.

Metallurgy makes similar requests of mining, and it is within the province of this paper to recount briefly to what progress the mining of certain kinds of iron ore has been stimulated by the demands of metallurgy.

Last year our laboratories prepared a paper dealing with the magnetic concentration of iron ores by the Grondal process, with some remarks upon the briquetting of such concentrates. This year we are happy to report considerable progress along both lines, as having great interest for Canada, and as indicating that the elements of a very important industry, as yet undeveloped, exist within her borders.

The conditions of supply in the iron ore markets of the old world are in a measure comparable to those which exist on this side, and particularly in the States. Recent years have witnessed the gradual depletion of ores best suited for the Bessemer process, until now there is a universal appeal from the metallurgical world to the mining world for relief from burdens which are becoming heavier year by year upon the

shoulders of pig iron and steel makers. The only visible means of relief seems to be (aside, of course, from the discovery of new ore bodies) some method of improving the quality of iron ore supply, such as an increased iron content, a lowerinlg of slag-forming impurities, with reduction of sulphur and phosphorus to the lowest limits. Magnetic iron ores lend themselves readily to such treatment.

There exist in Sweden and Norway large quantities of magnetic ores ranging from 30 to 60 per cent. iron content, with varying amounts of sulphur and phosphorus. In order to recover a sufficient percentage of iron to make operations profitable, fine grinding is necessary. With fine grinding the iron can be brought up by concentration to between 63 and 68 per cent. Under these conditions the Grondall process of wet concentration gives very satisfactory results. Last year the Engineering and Mining Journal published a list of 19 magnetic concentration plants actively in operation in Sweden, 12 of which now use Grondal apparatus entirely. At the present time there are a number of additional plants under construction, destined to use Grondal apparatus for concentration and briquetting. To show the substantial manner in which treated ores are coming to the relief of the iron ore situation abroad the following is a list of works which are using the Grondal processes for concentrating and briquetting:—

Works.	Tons ore Treated.	Concentrates.	Briquettes.
1. Strassa	150,000	75,000	60,000
2. Bredsjo	40,000	.....	20,000
3. Herrang	60,000	.....	30,000
4. Guldsmedshyttan	90,000	45,000	30,000
5. Uttersbergs	24,000	.....	12,000
6. Flogberget	50,000	.....	24,000
7. Lulea	60,000	.....	50,000
8. Sandvikens	.....	.....	12,000
9. Horndal	.....	.....	12,000
10. Helsingborg	.....	.....	50,000
11. Cwmavon (Wales)	.....	.....	36,000
12. Alquilfe (Spain)	.....	.....	40,000
13. Penn. Steel Co.	200,000	100,000	.....

Where tons of concentrates are not given, the whole output is briquetted. Where only briquettes are given, concentrates or fine or purple ores are used.

There are also under construction the following plants:

Works.	Tons ore Treated.	Concentrates.	Briquettes.
1. Hellefors	20,000	.....	10,000
2. Vigelsbo	20,000	.....	10,000
3. Salangen	300,000	.....	100,000
4. Sydvaranger	1,200,000	.....	600,000
5. Traversella	50,000	.....	25,000
6. Riddarhyttan	20,000	.....	10,000
			775,000

Sydvaranger Development.

The plant under construction at Sydvaranger is an interesting example of the extent to which the exigencies of metallurgy will drive mining into the remote corners of the globe. If anyone should propose to this Institute, as a feasible and profitable plan, the mining of iron ore containing only 38 per cent. metallic iron, in a latitude corresponding to that of our scarcely known Baffin Land, or as far north as the mouth of the Mackenzie River, he would probably be advised to take a complete rest for his health's sake.

Yet such a project is actually under way. A company has been fully financed by powerful German interests, all arrangements made with the Norwegian Government, and comprehensive plans perfected whereby a minimum production of 600,000 tons of concentrates annually will be producer, shipments to begin in 1910. The plant will consist of 40 units each, containing ball mill, crusher, tube mill and separators. At least 100 separators will be required. It has been found that standard Grondal ball mills will handle, on the average, 135 tons of hard magnetite ore per 24 hours.

The company at Salangen, Norway, is composed of certain German iron masters who will themselves absorb the entire annual production of 100,000 tons.

The foregoing has had to do with the commercial development of the Grondal processes. There have been some technical advances, however, of considerable interest, as follows:

(1) The introduction of heavy rock crushers, of the Gates or Blake type, for preliminary crushing, thus throwing less work upon the ball mills.

(2) Where the ore is of suitable character the use of magnetic cobbing machines to get rid of such rock pieces as contain little or no iron. This reduces the amount of ore to be handled in all subsequent operations, per ton of product.

(3) Somewhat finer grinding in the Grondal ball mills. It is generally found that the magnetite particles reduce more quickly than the gangue particles, so that the finer grinding does not necessarily involve reducing all the particles to pulpy condition. The practical effect of such finer grinding is a higher percentage of recovery and a higher iron content in the concentrates. As most of the concentrated material is destined to be briquetted, the fact that the grains are smaller is of no moment.

With regard to briquetting, the following may be noted as improvements:

(1) Better design of briquetting presses, reducing the wear. The life of the die plates has been quadrupled. At Cwmavon, working on pyrites residues, a single set is good for about 500 tons of briquettes.

(2) The original briquetting furnaces and cars were one metre wide. It has been found that this may be increased to 1.5 metres without materially increasing the investment. The result of the change is a 50 per cent. increase in the daily production of the furnace. The furnaces therefore will give a tonnage approaching the nodulizing kiln, with the advantage that the briquettes are more desirable from the metallurgical point of view.

(3) The fuel consumption, which in the one-metre furnaces had reached the low figure of 7 per cent. of the weight of briquettes produced, should be still further reduced in the wider furnaces.

(4) Bilbao spathic ore has been treated very successfully. The ore was first ground in a tube mill to 0.75 mm. mesh. The mill will grind about six tons per hour, using 75 horse-power to drive it. The ground ore was mixed with a little water, pressed and burnt in the usual manner. The original ore ran 47 per cent. iron, which, with the loss of carbon dioxide in the briquetting furnace, brought the iron content of the finished briquette up to 58 per cent.

RESULTS OF GRONDAL METHODS OF CONCENTRATING AND BRIQUETTING

Ores.	Crude Ore.			Concentrates			Tailing	Briquettes		
	Fe. p.c.	S p.c.	P p.c.	Fe. p.c.	S p.c.	P p.c.	Fe. p.c.	Fe. p.c.	S p.c.	P p.c.
Bredjsô	35.0	0.15	0.010	67.2	0.050	0.004	6.9	65.1	0.020	0.004
Flogberget	27.3	0.31	0.003	67.4	0.040	0.003	7.1	65.3	0.007	0.003
Guldsmedshyttan	50.7	3.0	0.003	70.1	0.5	0.002	10.2	68.2	0.010	0.002
Helsingborg (purple ore)	60.6	0.17	.....	.....	.....	.....	.....	60.6	0.023	.....
Herrâng	40.2	1.21	0.003	67.3	0.170	0.002	6.4	65.5	0.003	0.002
Hjulsjô	39.7	0.12	0.008	67.1	0.035	0.004	10.1	65.2	0.015	0.004
Luleâ	58.2	0.110	1.230	71.1	0.015	0.005	12.0	69.3	0.005	0.005
*Riddarhyttan	52.8	0.025	0.006	64.2	0.017	0.003	7.4	.....	.....	.....
Salangen	35.7	0.039	0.23	69.3	0.019	0.009	4.9	.....	.....	.....
Strassa	46.8	0.030	0.015	69.2	0.015	0.003	6.1	67.1	0.005	0.003
Stripa	40.3	0.030	0.010	67.1	0.020	0.002	12.2	65.2	0.005	0.002
*Sydvaranger	38.0	0.066	0.030	68.3	0.026	0.014	5.5	68.0	0.006	0.014
Uttersberg	34.5	0.020	0.024	62.6	0.020	0.016	9.3	.....	.....	.....
*[illegible] gelsbo	35.2	0.45	0.026	64.6	0.089	0.002	6.7	.....	.....	.....
Cwmavon	61.43	1.65	0.019	.....	.....	.....	.....	61.5	0.044	.....

*Under construction.

Fuel Economy.

Last year's paper referred to the fuel economy introduced by the use of Grondal briquettes as due to several reasons.

(1) High iron content and consequent small amount of material to be slagged off.

(2) Porosity of briquettes, permitting an enormous surface of contact between reducing gases and iron oxide (this porosity averages over 20 per cent. of the volume of briquettes).

We do not feel that our tests are suffiently complete to warrant positive figures as to fuel economy, as several factors influence the results. We may refer, however, to one test of 1,000 tons of Strassa briquettes, containing 65 per cent. Fe., put through a blast furnace at Cockerills' well-known works, Seraing, Belgium, where a fuel economy of 15 per cent. was claimed. If such results turn out to be actually realisable in practice they would have great significance for Canadian furnace men.

Market Prices.

During the past year the following prices have been paid: For concentrates, containing 68 per cent. Fe., for home consumption in Sweden, about $3.65 per ton, on cars at concentrators. For export, containing 65 per cent. iron and about 10 per cent. water, $4.25 at port of export.

For briquettes, f.o.b. port of export, for briquettes containing 65 per cent. Fe., sales have been made at $5.45 per ton.

Ten thousand tons have been engaged for Germany for this year at about $5.25 at same port. Purple ore briquettes from Helsingborg bring about $6 per ton c.i.f. Stockton. Pyrites resiudes briquettes from the South Wales works command from $5.50 to $6.35 delivered, according to cost of transport. These briquettes contain about 62 per cent. Fe. with sulphur down to 0.044 per cent.

Importance to Canada.

It seems to us that these results contain a lesson to us on this side of the Atlantic well worth a moment's consideration. In the first place, there are in Canada, and particularly in Ontario Province, numerous bodies of magnetite of some extent, which to-day are practically dormant. There is a rapidly growing production of pig iron and steel, with a correspondingly increased demand for ore. Some makers have even had to resort to the use of imported ores. Yet right in Canada there are all the elements of a vast and profitable industry—an industry of basic importance to a country's prosperity—requiring only the awakening touch of intelligent capital to spring into active being.

Without making a plea for any particular apparatus, but assuming that the Grondal methods are employed, two locations present themselves as promising. These are shown as follows:

Central Ontario Valley.

In Fig. 1 is shown an outline of the C. O. Railway, upon which we have marked some of the deposits of magnetitic ores. At some of these deposits there could

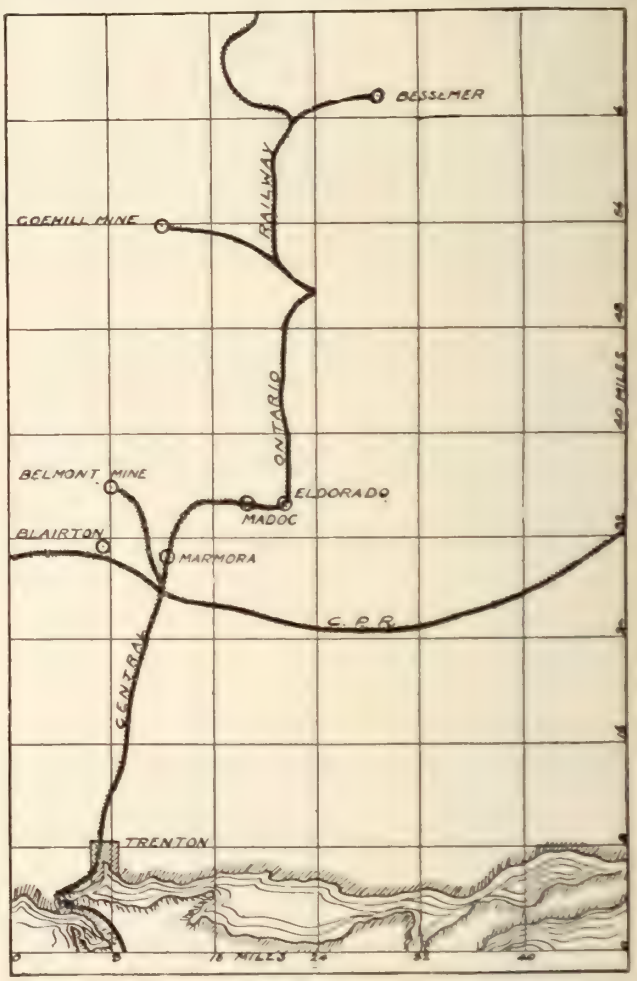


FIG. 1.

doubtless be mined a certain amount of shipping ore, but all of them contain large quantities of ore from 45 per cent. down in iron, which could profitably be treated. The distances from Trenton are approximately as follows:

To Marmora	30 miles.
To Blairton	35 miles.
To Madoc	40 miles.
To Eldorado	40 miles.
To Belmont	35 miles.
To Coe Hill Mines	75 miles.
To Bessemer Mines	85 miles.

Now if a central briquetting plant were to be located at Trenton, to which all materials could be sent, we

would have a plant producing marketable products within an average distance of 50 miles from the mines, which is less than the distance from many Lake Superior mines to nearest lake ports.

Kingston & Pembroke Railway.

Fig. 2 shows a similar scheme, with Kingston as terminus, with the following approximate distances:

To Godfrey	29 miles.
To Verona	25 miles.
To Glendower	35 miles.
To Clarendon	55 miles.
To Robertsville	59 miles.
To Wilbur	67 miles.
To Calabogie	89 miles.

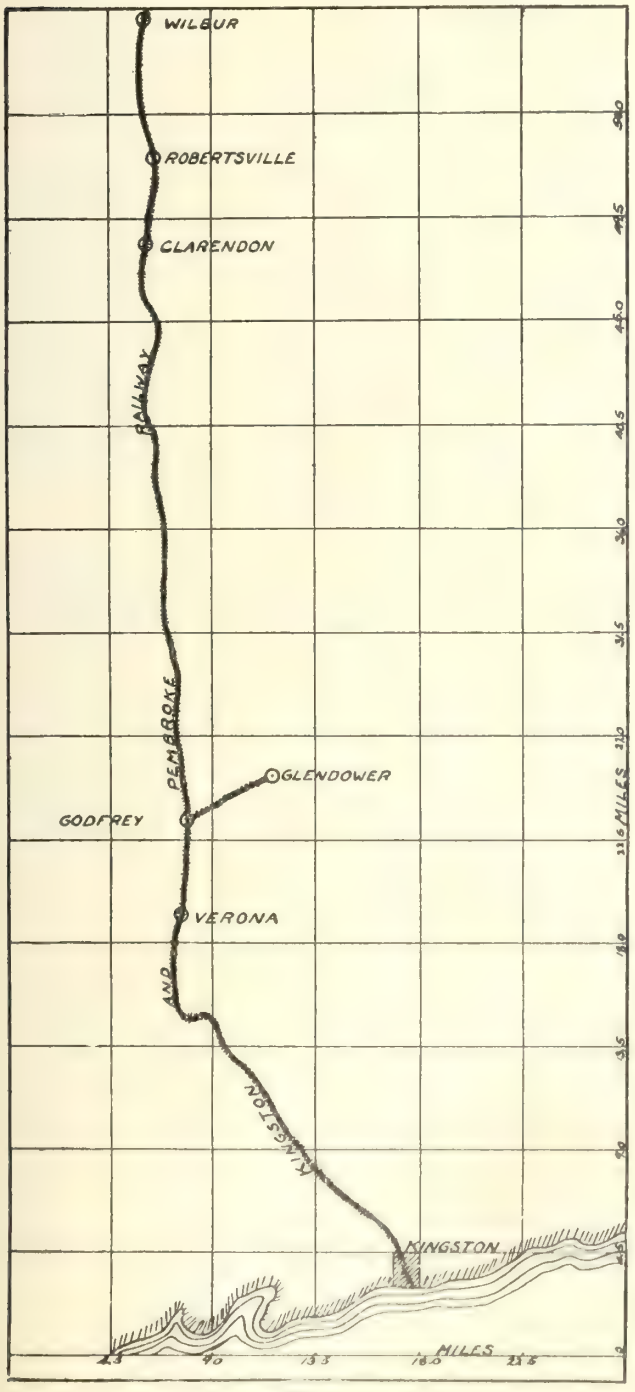


FIG. 2.

From these points an average freight rate of 65 cents a ton could probably be obtained. A central plant at Kingston would be under practically similar conditions with respect to its sources of supply as the Trenton location. It might be found upon close study that it would pay to ship all ores to a central point where both concentrating and briquetting could be done in a single plant under one management.

Cost of Products.

Based upon 40 per cent. ore, as a maxiumum figure of 80 cents per ton loaded at mines, 2 tons would be needed per ton of concentrates	$1.60
Average cost of concentration on a production of 200 tons daily	.40
Cost of concentrates	2.00
Average cost of briquetting on 200 ton basis	.45
	2.45
Freight on 2 tons ore at 65c	1.30
Cost of briquettes	$3.75

Market Values.

Under the above conditions we would have for sale a briquette containing from 63 to 65 per cent. metallic iron, low in sulphur and phosphorus, easily reducible in the blast furnace with economy of fuel; such briquettes would be superior to the average run of old range Bessemer ore, on which the guarantee is now 55 per cent. iron. The present price for such ore is $5 per ton, according to The Iron Trade Review of February 13, 1908. In European and United States markets Grondal briquettes would readily command a minimum price of 10 cents a unit, or $6.30 delivered. This leaves a margin of $2.65 per ton to cover freights and profits. There is no reason to believe that equal selling prices could not be realized in Canada. The Swedish companies using the process have formed the Iron Expert Association, whose products find a plentiful and profitable market in Europe. It is interesting to note that every operating company has been a financial success from the start.

With rich ores commanding a premium and the iron and steel world eager for them, there is no good economic reason why many idle spots in Canada should not teem with this modern industry; why mining should not once more respond to the call of metallurgy.

PERMITTED BRITISH EXPLOSIVES.

The following is a complete list of the names of permitted explosives defined in the schedules to the Explosives in Coal Mines Orders of December 17, 1906, of April 8, 1907, and of May 26, 1908:

Explosives in first schedule:—Abbcite, albionite, ammonal, ammonal B., ammonite, amvis, aphosite, arkite, bellite No. 1, bellite No. 3, bobbinite, britonite, cambrite, carbonite, celtite, cliffite, clydite, colliery steelite, Cornish powder, curtisite, dahmenite A, dragonite, electronite, excellite, extra carbonite, Faversham powder, fracturite, geloxite, good luck, haylite No. 1, kolax, kynite, kynite condensed, minite, monobel powder, negro powder, Nobel carbonite, normanite, oaklite No. 1, oaklite No. 2, odite, permitite, permonite, permonite II, phoenix powder, pit-ite, rexite, ripping ammonal, rippite, roburite No. 3, russelite, saxonite, stow-ite, thunderite, titanite, tutol, victorite, virite, westfalite No. 1, Westfalite No. 2, withnell powder.

Explosives in second schedule.—Bickford's igniter fuse.

A NEW IRON ORE FIELD IN THE PROVINCE OF NEW BRUNSWICK.*

By John E. Hardman, S.B., Ma.E., Montreal, Que.

(*Continued from last issue.*)

The following record of the seven holes drilled is necessarily abbreviated, but for the purposes of this paper will be sufficiently comprehensive.

Borehole No. 1 was located some 200 feet south of the northern end of the deposit found Area No. 1. At the northern end of this area there is a small hill, rising on the southern bank of Austin Brook precipitously to a height of 78 feet, from which height there is a gradual descent to the south of nearly 40 feet, and at the base of this slope and on the hanging, or western, wall of the deposit No. 1 Borehole was put down to a depth of 162 feet. It was in ore continuously from 35 feet to the bottom, giving 127 feet of core which was analyzed for insoluble matter, iron, phosphorus and sulphur, the average length of core represented by each analysis being 10 feet. In this core there was found to be great variation; insoluble matter ranged from 8.04 per cent. to 27.74 per cent.; metallic iron had a minimum of 39.6 per cent. and a maximum of 57.2 per cent. phosphorus varied from .486 to 1.007, and sulphur showed variations from .047 per cent. to .699 per cent. Close inspection of the results when tabulated showed that the ore occurred in bands or strata, ribbon-like, and that these strata were easily separated the one from the other, so that it would be quite posible to hand sort the ore into two piles, one of which would easily exceed 52 per cent. of metallic iron with a minimum of silica, and the other would contain approximately 45 per cent. of metallic iron with the maximum amount of silica. These bands or strata of good ore range from 10 to 25 feet in thickness. Subsequent stripping of the surface clearly showed a banded structure.

No. 2 Borehole was put down approximately in the middle of Area No. I, about 800 feet south of the first borehole. Its depth is 161 feet. It began in iron ore and showed 140 feet of merchantable ore. Like No. 1 hole it shows a banded structure and out of the 140 feet there are 60 feet which average:

Metallic iron 54.11 per cent., insoluble matter 16.7 per cent., phosphorus 0.73 per cent., sulphur 0.098 per cent.

On the bank of the Nipisguit River, and at the extreme southern end of Area No. I, Borehole No. 3 was located but, unfortunately, upon the foot wall instead of on the hanging wall of the deposit; it therefore proved barren, but a sample taken from the surface at this point gave: Metallic iron 51.6 per cent., silica 15.28 per cent., phosphorus .82 per cent., sulphur .05 per cent.

No. 4 Borehole was put down about 450 feet to the westward of the outcrop and about its centre; this made it on the hanging wall of the ore body. The total depth attained by this hole was 527 feet, the first ore was encountered at a depth of 434 feet and for 70 feet, or to a vertical depth of 504 feet, the ore was found continuous and of the same quality as has been shown in the previous analyses.

These four holes proved the existence of an ore body of at least 2,140 feet in length to a depth of 500 feet below the surface, which, in itself, is a very considerable deposit. Of this large amount of ore fully one-half will give 53 per cent. metallic iron and not over 15 per cent. of silica.

Area No. II, so-called, lies about 1,000 feet to the eastward of Area No. I. It presents at least five distinct outcroppings in the shape of knobs or small lenticular masses, the axis of which has a more easterly direction, being north 30 degrees east, as against north 15 degrees east for Area No. I. No boreholes were put down upon this area, which previously had had some stripping done by a representative of the Dominion Iron & Steel Company. From the lines of the magnetometric survey made by Mr. Lindemann it will be fair to assume a length of 1,500 feet for the axis of the ore body in Area II. Surface samples from this Area gave the following anlysis:

Iron	50.23
Silica	15.32
Phosphorus	0.623
Manganese	1.29
Sulphur	0.044
Alumina	0.94
Lime	2.18
Magnesia	0.26

Area No. III. is an oval shaped area lying from 3,000 to 5,000 feet north of the northern bank of the Nipisguit River in Lot 12 of the 17th Range of the Township of Bathurst; the major axis of this area has a direction of north 30 degrees east, and a length so far proved of 2,400 feet. Within this area are half a dozen or more outcrops which, if I may express my belief, will be found to unite when stripping has been accomplished, into one or possibly two large lenses or bodies of merchantable ore. Up to the present time only three drill holes have been put down on this area, which have proved large bodies of a better grade of ore than in Area No. I, and have shown the dip to be to the westward at angles ranging from 54 to 56 degrees.

Borehole No. 5, at a distance of about 700 feet from the southern edge of this area, was sunk vertically upon the hanging wall of the ore body to a depth of over 350 feet. Ore was encountered at a depth of 23 feet, and the core was continuously in ore to 347 feet, showing a vertical depth here of at least 324 feet, or, on dip of 55 degrees, a transverse width of ore in excess of 190 feet. Thirty-three analyses were made of this core in portions representing (with one exception) 10 feet of the core. The same structure was revealed that was shown by analyses of Boreholes 1, 2 and 4, namely, that the ore was composed of bands of excellent commercial grade and 3 bands of a lower grade than is, at the present time, in demand. The first 50 feet of the core, i.e., from 23 feet to 73 feet, gave the following average analysis: Insoluble matter 13.4 per cent., metallic iron 52.68 per cent., phosphorus .99 per cent., sulphur .047 per cent.; this was followed by 50 feet of ore giving over 20 per cent. of insolubles and less than 45 per cent. of iron. Then followed 20 feet with 15 per cent. insolubles, 52.58 per cent. of iron, .752 per cent. of phosphorus, and .05 per cent .of sulphur. This, in turn, was succeeded by 70 feet of ore averaging only 44.3 per cent. of iron and running high in silica and sulphur. After this came 50 feet of good ore, averaging 53 per cent. metallic iron, which in its turn is followed by 40 feet of 46 per cent. ore; the whole concluding with 44 feet of ore, the analysis of which gives 12.25 per cent. of insolubles, and 54 per cent. of metallic iron.

This hole was put down on what, upon further investigation, may prove to be the easternmost bed in this No. II area; at a transverse distance of 250 to 300 feet to the west another series of strongly magnetic lenses appear, but none of them have been drilled. The last

* Incorrectly printed "British Columbia" in last issue.

hole, No. 7, is located about 750 feet north of No. 5; it encountered iron ore at a depth of 30 feet and passed out of the ore at about 107 feet; in this 77 feet there are nearly 60 feet of excellent ore. Beginning at 40 feet in depth up to 83 feet there is a length of core 42 feet 6 inches long, which averages 53.10 per cent. metallic iron, with 17.02 per cent. of insoluble matter. From 91 feet to 107 feet there are 16 feet of ore averaging 54.32 feet metallic iron, with 14.37 per cent. of insolubles.

Consideration of these figures will, I think, clearly indicate that iron ore in very large quantities exists in this hitherto unknown region. The depths to which the boreholes have proved the existence of the iron, coupled with the horizontal extent over which the ores are known to exist, and the widths (which have been measured to average fully 100 feet) demonstrate that the bodies are large.

The analyses of the cores is not altogether satisfactory from a chemical point of view, inasmuch as the method followed (by digestion in acid) does not show the true silica, but only silica plus silicates and other insoluble compounds, which, from the iron master's standpoint, may be a very different matter. In the present case the "insolubles" are really country rock, which has previously been mentioned as igneous. The insolubility of many silicates in strong acids is well known to chemists. The gabbros and diorites of the hanging wall, with the muscovite and chlorite of the foot wall, contain silica percentages ranging from 50 to 80. In the few complete analyses which have been made of the ore (the silica having been determined correctly, either by fusion or by the hydro-fluoric acid method) the actual percentage of silica has ranged from 7 to 12, and there have been found amounts of alumina ranging from .05 to 1.2, lime from 2 per cent. to 3 per per cent., and magnesia from ½ to 1 per cent.

By hand picking or rough lump sorting fully one-half of these large ore bodies can be made to average from 57 to 58 per cent. metallic iron, with 10 per cent. of silica; the phosphorus in such ore will run about 0.88 per cent. and the sulphur 0.055 per cent. With ores of such a character no gentleman conversant with the iron ore markets of the European continent would be disposed to quarrel.

For such a basic ore the demand is now large and steady, and the location of this new field within 20 miles of a sheltered deep water harbor enhances its commercial importance, as ocean shipments from this harbor can be made during at least 9 months of the year.

The property, including some 30 square miles of territory, passed into the control of the Drummond Mines, Limited, in November, 1907, and by this corporation it will be actively exploited this summer; it will also be tested in the furnaces of the Londonderry Iron & Mining Company, although its composition is such as to occasion no uncertainty as to the quality of pig iron obtainable from it.

Although the ore is a non-bessemer, the significance of this new district to Eastern Canada is very great. Iron ores of good quality are scarce in our Dominion, and so far have been at considerable distances from the seaboard; it is, therefore, with the feeling that this new field is well worthy of a preliminary notice, and that it will probably add very largely to the Dominion's resources of furnace ore, that I have ventured to bring this account to your notice.

RULES RELATING TO THE TRANSVAAL STOPE-DRILL COMPETITION, 1908.

Preliminary.

The Transvaal Stope Drill Competition is being organized by the Transvaal Government and the Transvaal Chamber of Mines, which are jointly contributing the prizes, and have nominated a joint committee which has drawn up the conditions under which the competition is to be held, and which will arrange and carry out the competition.

The object of the competition is to obtain a small drill capable of economic use in the narrow stopes on the Witwatersrand, which are at present worked for the most part by hand labor. With this object in view, the committee has endeavored to make the conditions as practical as possible.

To reduce the number of competitors within manageable limits, power is taken to reject or eliminate entries which are obviously outclassed or unsuited to the existing mining conditions.

In the final competition, mining conditions must be taken to mean work in stopes varying in width from 20 inches to 48 inches, and with a dip varying from 20 degrees to 90 degrees. It may be assumed, further, that probably 90 per cent. of the holes drilled will be down holes.

The committee anticipate that all or most of the machines entered will be worked by means of compressed air, the most usual method on the Witwatersrand; but, should any entries offer of machines worked by other kinds of power, the committee will consider such machines.

Competitors who desire to protect their patent rights must make their own arrangements for obtaining provisional protection.

CONDITIONS OF THE TRANSVAAL STOPE DRILL COMPETITION.

A.—General.

1. In these conditions the following expressions are used, with the meanings set against them:

"The committee" means the Technical Committee appointed jointly by the Transvaal Government ond the Transvaal Chamber of Mines to arrange and carry out the competition, or any duly appointed sub-committee or representatives of the committee.

"Competitor" means the person, firm or company entering a machine for the competition. A competitor will be treated as a separate competitor in respect of each type of machine entered by him, the committee deciding what constitutes a different type.

"Machine" means the whole drilling machine, without supports or dust-allayer, provided the supports and dust-allayer are not integral parts of the machine, and does not include the drill.

"Drill" means the jumper.

"Bit" means the cutting end of the drill.

"Elimination trials" means the preliminary trials on surface and underground.

"Competition" means the final trial underground.

2. The decision of the committee in all matters relating to the trials and the competition shall be final. Competitors shall be bound by these conditions. The committee reserves the right to relax, alter or add to the requirements of any of these conditions should it think it desirable in any particular case. The committee reserves the right to repeat the trials or competition or any part thereof in respect of any entry should it think fit.

3. The committee may disqualify any competitor in respect of any or all of his entries, if satisfied on enquiry that he has interfered in the conduct of any of the trials or competitions or has corrupted any miner, or has attempted to do so, or if he refuses to comply with any conditions laid down by the committee. No prize shall be awarded to any entry in respect of which any competitor is so disqualified.

B.—Entries.

4. Entries must be received on or before December 31st, 1908, by the

"Secretary of the Committeee,
Transvaal Chamber of Mines,
Johannesburg,
Transvaal."

Entries must be made on a form which may be obtained at the above address, or from the

"London Secretary,
Transvaal Chamber of Mines,
202 Salisbury House,
Finsbury Circus,
London, E.C."

5. All entries must be accompanied by:

(a) Detailed specifications and drawings.

(b) A list of prices of the machine and accessories, including drills, bars and arms (where such are required) and spare parts, and an illustrated and numbered list of spare parts in triplicate.

(c) A guarantee to the satisfaction of the committee to supply machines and accessories in Johannesburg at the price quoted in the price list, subject to ordinary trade fluctuations in the price of materials.

(d) With respect to the conditions contained in paragraphs (b) and (c) of this clause, if an intending competitor is unable to assign prices to the machine and its accessories, he shall at the time of his entry notify the committee in writing of this fact, and also of his acceptance of the following conditions:

(1) The machine and accessories shall, for the purpose of the competition, be valued by the committee.

(2) The competitor shall enter into an agreement to allow the Transvaal Chamber of Mines or its nominees to manufacture and use the machine and accessories at a royalty of a percentage on actual cost, such percentage to be stated by the competitor at the time of entry.

6. Each competitor shall at the time of entry nominate a representative for all purposes of the trials and competition, who may be either himself or another person. Such representatives must be in Johannesburg throughout the trials and competition, and may be present with his machine at any time. The committee may allow the appointment of an alternate.

7. No entry will be acepted in respect of a machine weighing more than 100 pounds. It is desirable that the machine should be lighter than 100 pounds, as the need of the industry is for a one-man machine.

8. All machines, accessories and parts intended for use in the trials or competition (other than drills) shall be personally delivered free of cost in Johannesburg by the competitor's representative to the committee not later than January 31st, 1909, at such place as the committee shall appoint, and no machines, accessories or parts not so delivered shall be used in the trials or competition, except as desired by the committee.

9. All machines, accessories and parts so delivered shall remain in the possession of the committee, which shall not be responsible for loss or damage in the course of the trials or competition, and which reserve the right to retain any machines or spare parts for the purpose of testing materials.

10. Each machine shall be supplied in a strong box fitted with a padlock, and the acessories and spares shall be supplied in a separate box with padlock.

11. Competitors must supply with each machine a suitable dust-allayer, which may be either a part of the machine, or attached to it, or separate.

12. Each competitor must supply three machines to the committee, and may supply such other machines and spare parts as he may desire, which shall be kept in the custody of the committee and issued for use only with the committee's consent.

13. A competitor may supply his own drills, and may change the supply during the competition on complying with the conditions of Clause 5, but the committee reserves the right to decline to use any drills so supplied if it considers them unsatisfactory.

14. No entries will be accepted which do not fulfil the conditions of Clauses 4 to 13 inclusive.

15. The committee reserves the right to reject the entry of any machine which appears to it, from the drawings and specifications, to be unsuitable in material or design.

16. No entries may be withdrawn except by permission of the committee.

C.—Elimination Trials.

17. To reduce the entries for the first six months' underground competition to a number that can be conveniently handled, elimination trials will be held successively on the surface and underground.

18. The following conditions will apply to the elimination trials, both on surface and underground:

(a) The competitor may, if he so desires, provide his own operator, but the committee reserves the right to put the machine to such tests under its own operators as it may think fit.

(b) All holes drilled shall not be less than 42 nor more than 48 inches in depth (no credit being given for any depth beyond the maximum), and shall be drilled with not more than four steps of gauge. The size of the starting and following bits will be left to the choice of the competitor, but the last bit used shall gauge at least 15-16 inch at the conclusion of drilling.

19. The following conditions will apply to the surface elimination trial only:

(a) Two machines of each entry, or more at the discretion of the committee, will be tested as to their efficiency in drilling down holes in granite blocks.

(b) Competitors may decide the air pressure to be supplied, which shall not be less than 60 pounds nor more than 75 pounds per square inch. In the absence of any requisition from the competitor, the pressure will be 75 pounds per square inch.

(c) Each machine will be tested for one hour actual drilling time, provided that a total of two hours for rigging up, changing drills, drilling, etc., is not exceeded.

(d) The air consumption of each machine will be taken into account in deciding whether such machine has passed the elimination trial.

(e) All entries will be eliminated which cannot drill a minimum of one inch per minute of actual drilling time.

20. The following conditions will apply to the underground elimination trial:

(a) Only machines which have passed the surface elimination trial will be allowed to enter.

(b) One machine of each entry will be subjected to this trial.

(c) The trial will last three periods of eight hours each, such periods to include time spent in changing drills, rigging up, etc.

(d) All trials will, if practicable, be conducted in the same stope at the air pressure prevailing, which shall not be less than 60 pounds nor more than 75 pounds per square inch.

(e) A machine will only be allowed to drill three holes per rig-up, each rig-up to be at least 15 feet from the previous one.

D.—The Competition.

21. At the end of the underground elimination trial, the committee will arrange the entries taking part therein in order of merit with regard to footage drilled and air consumed, and will then decide which may enter for the competition.

22. All machines not eliminated in the previous trials will be entered for a competition under practical working conditions underground, which will begin about April 1st, 1909, and is expected to last six months.

23. Two machines of each entry will be run for 300 shifts each, by day and night, continuously, with the exception of Sundays and legal holidays. The length of shift will be of equal duration on each mine.

24. If any entry of which two machines, in spite of the provisions of Clauses 32 and 35, fail to complete 300 shifts each, the footage drilled shall be charged with the estimated cost of 300 shifts; but time lost through no fault of the machine may be made up with the consent of the committee.

25. The mines and working places in which the competition will be carried out shall be selected by the committee. So far as practicable, each entry will be run for an equal period in each stope in each mine selected.

26. Each pair of machines will in each shift be in the charge of one white miner selected by the committee, with such native assistance as in the opinion of the committee is required.

27. During the competition the machines will do ordinary mining work, in according with instructions given to the miners from time to time by the committee. Not more than two holes on any one rig-up shall be counted, except with the express sanction of the committee. Any number of bars of any length may be used. As far as practicable the conditions under which the diffirent machines work shall be kept uniform.

28. The competing machines will not be required to cut pillars, box holes, etc.; this will be done by the mines.

29. The miner will be forbidden to use any machine or spare parts except those issued to him by a representative of the committee.

30. A reasonable supply of spare parts will be issued to each miner from time to time by the committee as required for each machine operated by him. The miner will sign a receipt for all such issues, and will keep them under lock and key in a box provided by the committee.

31. All worn and replaced parts shall be returned by the miner to the committee not later than the end of the shift in which they were thrown out. A label, signed by the committee's representative, shall be attached to each such part, shewing the period for which it has been in use.

32. If either of the pair of machines at work is so disabled as in the committee's opinion to require to be sent to the surface for repair, a third machine, supplied by the competitor and stored in the working place, shall be issued by the committee to take its place, but such third machine shall be returned as soon as the repair is completed. Machines supplied by the competitor in addition to the three required by Clause 12 shall only be issued with the special sanction of the committee.

33. When any machine is to be moved from a mine or working place in which it has been tested to another, it shall be handed over, together with all spare parts in hand, by the miner to the committee, and checked by the latter. The removal will be entirely under the control of the committee.

34. No machine will be operated at a pressure exceeding 75 pounds or less than 60 pounds per square inch at the end of the pipe line, as shown by recording gauges.

35. The air consumption of each machine will be tested on the surface at least once a month during the competition, at intervals chosen by the committee to afford a good knowledge of the average consumption by the machine underground. While a machine is withdrawn from work for this purpose, its place will be taken by a third machine supplied by the competitor. Should this for any reason be impossible, the time lost may be made up.

E.—Basis of Award for Machines.

36. The first price of £4,000 will be awarded to that entry for which the total cost when divided by the total footage drilled by all machines of that entry during the

competition is least, the committee reserving the right, in case of two or more entries showing approximately equal results, to ignore small difference in points and award the prize to that entry which it considers best suited for the Rand, having regard to weight, general design, ability to drill deep holes, freedom from stoppages and breakdowns, facility of handling, and suitability to norraw stoping.

37. The second prize of £1,000 will be awarded to that entry which is considered by the committee, on the basis laid down in the preceding paragraph, to be second best.

38. The footage drilled shall be measured at the end of each shift. No hole of a depth of less than 42 inches shall be counted, except where authorized in special circumstances by the committee's representative, provided that any hole fitchered at a depth of not less than 30 inches shall be counted. The last bit used shall gauge at least 15-16 inch at the conclusion of drilling.

39. For the purposes of Clause 36 "Cost" shall mean the cost of:

(a) First cost of machines and rig-up gear, less valuation at end of the competition.
(b) Miner's wages.
(c) Native labor.
(d) Air.
(e) Water.
(f) Drill sharpening.
(g) Maintenance.
(h) Stores.

40. As regards the above items the following rules shall apply:

(a) Machines and rig-up gear will be debited to cost at prices fixed as prescribed in paragraph 5, but will be valued by the committee at the end of the competition, and the value so assessed will be taken to credit of the competing machine.
(b) A proportion of miner's wages will be charged, viz., 5s. per machine shift.
(c) Native labor will be charged at a uniform cost per head per shift on each mine throughout the competition.
(d) Air will be charged at a price per cubic foot according to pressure used, as fixed by the committee. These prices will be uniform on all mines.
(e) All water used will be charged at cost.
(f) Drill sharpening and making drills will be charged at cost, which, if competitors supply their own sharpening machines, will include maintenance and depreciation, but not first cost, of sharpening machines.
(g) Maintenance—
  (i.) Spares, including hose and coupling, will be debited as issued; any returned unused being taken to credit.
  (ii) Repairs mean actual shop charges and fitter's time charged at a standard rate fixed by the Committee.
(h) Stores, to include drills, lubricants and waste. Drills will be charged at ruling prices, except when suplied by the competitor, when they will be charged at prices fixed as prescribed in para. 5.

41. Competitors may supply their own drill sharpening machines, but the committee takes no responsibility for their safe return or for any damage sustained. Competitors may, with the consent of the committee, instruct the drill sharpeners, except where otherwise arranged by the committee. All drill sharpening will be done under the control of the committee on the mine where the machine is competing, and by usual drill sharpeners on the mine.

42. Repairs must be done in the shops of the mine where each machine is competing, but competitors may provide their own fitter, who shall not be allowed underground.

F.—Choice of Miners.

43. Miners will be chosen in pairs, to work day and night shifts in partnerships. Mine managers will be asked to nominate pairs of men, who should be machine men chosen on grounds of general intelligence, whether employed on the nominator's mine or not, and to state their qualifications and experience. From the list obtined the number of partnerships required will be selected.

44. Miners will be paid 25s. per shift, with a bonus of one-eighth of any profit made by the committee through the work in the stope in which the miner is employed. Each miner will sign a contract with the committee to work the whole six months of the competition, and to permit the retention of 10 per cent. of his wages till the expiry of his contract. Should he leave before such expiry, except on account of illness or accident or other cause approved by the committee, the amount retained shall be forfeited, and may be paid at the end of the competition to the miner taking his place. A miner temporarily absent through illness, accident or other good cause may be temporarily replaced by a man employed by the committee on day pay.

45. Each partnership will as far as possible work in one stope throughout the trial, and will work in accordance with instructions given by the committee.

46. The committee may dismiss and [or] disqualify for a prize any miner whom it may consider to be incompetent or otherwise unfit for the position.

G.—Basis of Award for Miners.

47. The first prize will be awarded to that partnership whose cost per fathom broken is least, provided that a factor shall be used to equalize the conditions in different stopes, such factor to be arrived at by the committee after obtaining an estimate of the price per fathom in each stope from a sub-committee consisting of the managers and mine foremen of all the mines selected for the competition.

48. The remaining prizes shall be awarded on the same basis.

49. The prizes shall be:—

1st.—£300 to the winning partnership.
2nd.—£200 to the second partnership.
3rd.—£100 to the third partnership.

50. In the event of a prize going to a partnership which has been changed during the competition, the prize money will be divided between the two partners working at the end of the competition according to the time worked by each, but any partner who has left on account of sickness shall receive a share proportionate to the time he has worked.

51. The stopes will be specially surveyed at the beginning and end of the competition, and at such other times as the committee may think necessary, on the

lines laid down in the Interim Report of the Mining Regulations Commision.

52. The costs charged against the miners shall be the same as in the case of machines (see paragraph 39 above), with the addition of the cost of explosives used.

53. A deduction shal be made for fathomage estimated to have been broken by a miner with a machine, the entry of which is withdrawn or disqualified.

BOOK REVIEW.

General Index to Reports of the Geological Survey of Canada—1885-1906. Compiled by F. J. Nicolas. Printed by the Government Printing Bureau, Ottawa, 1908.

The absence of a full and reliable index to the publications of the Geological Survey of Canada has long been a grievance. Searchers for information touching any given topic have had no alternative but to wade in and look through the whole uninventoried stock. Apart from the loss of time thus occasioned, unnecessary strain was put upon the readers' temper. Thus, publications of great intrinsic value have lost much of their interest.

The new index remedies this state of affairs. For the period that it covers it is complete, accurate, and most accessible. Typographically everything is so arranged as to make reference easy and rapid. Cross-references are not multiplied needlessly. Nevertheless wherever necessary ample subject cross-references are given.

The precise accuracy with which all references have been checked is evident on every page. One or two instances will serve to illustrate. On pages 101-102, there are no less than twenty-seven "Black Rivers" classified and differentiated. Under each of the twenty-seven, sub-references are given.

On page 316, under the black-letter title "Fish," there are fifty-six light-type sub-references grouped. These sub-references are again grouped under the sub-titles of provinces. Thus the reader can see at a glance exactly what he wishes to look up and exactly where to find every mention of it.

The reports of field geologists sometimes contain errors in the nomenclature of places, or topographical features. The compiler has avoided -copying these blindly. In all cases of uncertainty or error, the names of localities have been verified and in several instances the authors of reports have been set right.

All of this, of course, was not possible without generous help from Survey officials and others. Mr. Nicolas, indeed, tenders warm thanks to all the officers of the department. Of the assistance of Mr. D. B. Dowling, Mr. Hugh Fletcher, Dr. R. W. Ells, and Mr. W. McInnes he makes grateful mention. He also mentions his indebtedness to Mr. James White, Dominion Geographer, who gave most important assistance in checking over the speling of the names of Canadian localities. Mr. Nicolas also indicates his gratitude to Dr. A. P. Low for constant encouragement and kindly criticism.

The index is a radical departure both in the science of index making (of which it is a brilliant example), and in the publications of the Survey.

The Geological Survey and the compiler are deserving of large credit.

EXCHANGES.

The Iron and Coal Trades Review, June 19th, 1908.—Under title "A Dormant Factor in the Iron Industry" the Review draws attention to the position of France as a future producer of iron ore. Both Germany and Belgium are increasing their demands upon French sources. Sooner or later Great Britain will be forced to purchase ore from France. Meanwhile the Republic conscious of her latent strength, is developing her iron industry rapidly. The present cordial relations existing between Great Britain and France are thus given a commercial significance.

The Colliery Guardian, June 19th, 1908.—Mr. James Ashworth, in a communication to the Guardian, takes up mine watering. The "percentage" of saturation effected by means of any method of watering, varies in different parts of any mine. The deep mine is hotter and drier than the shallow mine. A man working in an atmosphere of 82 to 85 degrees F. can exist only for a limited period. In a warm saturated atmosphere of, say, over 82 degrees F., the perspiration from a man's body cannot pass away and therefore no sense of coolness is possible. Hence watering is inapplicable to deep mines and some other means will have to be found.

The South African Mining Journal, May 30th, 1908—The Journal alludes editorially to the slowness with which dust-allaying devices are being introduced on the Rand. A clause of the Mining Regulations says that no rock drill may be used without means being provided and employed to allay the dust generated in drilling. This instruction is not sufficiently explicit to be effective. Experience has taught that a simple jet of water playing just above the collar of the hole is the method that is most useful and that proves most acceptable to the miners. Although this plan has been adopted in one or two mines with excellent results, it is not yet in general use. It should be made compulsory, at least in drifts and raises. The "extraordinary apathy and even active opposition" of the miners towards steps such as this for ameliorating their hardships, is remarked upon.

PERSONAL AND GENERAL.

Mr. Floyd Harman has assumed the management of the Cochrane mine, Cobalt, Ont. The buildings on this property were destroyed by the recent fire. Rebuilding will be commenced at once.

Mr. J. L. Retallack, who with Mr. Louis Pratt, have spent many months in Ottawa, in the interests of Kootenay lead producers, passed through Toronto on the 26th of June on his way to the west.

Mr. T. R. Drummond, formerly manager of the Dominion Copper Company and, until recently, manager of the Nipissing mine, Cobalt, Ont., has assumed the managership of the Cactus mine at Newhouse, Utah.

Representatives of the Western Branch of the Canadian Mining Institute are to meet the special train at Fernie, B. C. At Victoria a special committee, of which Premier MacBride is chairman, will have charge of the reception.

To entertain the Canadian Mining Institute delegates and their guests the folowing committee of Rossland, B. C., citizens has been appointed: Mayor McDonald, Messrs. R. H. Stewart, P. S. Couldrey and A. G. Larsen. The committee will act in conpunction with the Mayor and city council and the Board of Trade.

Mr. W. H. Boyd has been appointed topographer in charge of the topographical work of the Geological Survey. The excellent topographical work he has done in the west as shown in the Boundary and Rossland special maps, is a guarantee that the general standard of accuracy of the Survey maps will be increased under his supervision. Nothing is of greater utility to the public as a whole than good topographic maps and this recognition of topography by the Survey may be read to mean that topographical work will receive a similar place in the Canadian Survey as has been given it in the United States Geological Survey.

INDUSTRIAL SECTION.

Amatite Roofing.—The objection urged against the use of ordinary prepared roofing is that it requires coating periodically with heavy paint. Amatite roofing is free from this criticism. A top surface of crushed mineral makes painting unnecessary. It is weather proof and so substantial that repairs are not necessary until years of service have been got out of it. A sample will be sent on request by the Paterson Manufacturing Company, Limited, Toronto.

The Jenckes Machine Company, Sherbrooke, Que., Catalogue No. 112, Second Edition, 1908.—In addition to their Sherbrooke works this company has recently erected large branch works at St. Catharines, Ont. The catalogue before us gives descriptions of the Jenckes horizontal tubular boilers, standard smoke stacks, grate bars, rocking grates, high pressure tubular boilers, vertical tubular boilers, steel penstocks, eac. All boilers are tested to ahydrostatic pressure of at least one and one half times their specified working pressure before leaving the works. A boiler inspector's certificate of inspection is furnished at actual cost.

Catalogue 26, June, 1908.—The Jeffrey Manufacturing Company.—The Jeffrey centrifugal fan for mine is the subject of this pamphlet. After a year of systematic testing the Jeffrey Compang has brought out a fan especially designed to meet the demand for large volumetric capacity at low speds and against high water gauges.

The positions and curvatures of the vanes, which discharge the air in a true radial direction, with no dragging effect, are special features of this fan. The bracing is especially strong and does not obstruct the air inlet. Steel is the only material of construction and each fan is assembled and erected, perfectly balanced and marked in every part before being shipped.

Reactions.—A quarterly bulletin distributed by the Goldschmidt Thermit Company, is filled with interesting reading. The Thermit Process is applicable especially to rail welding. The operation of welding can be performed without interruption to traffic. A gang of four men can make 20 or more joints per day. The Thermit weld has been used for a wide range of work, from steel ladles in copper smelters to the rudder frames of large steamships.

The process is based upon the reduction of metallic compounds by aluminium. The reaction is accompanied by a considerable evolution of heat and propagates itself from one point until the entire mixture is affected. As a means of starting the reaction barium proxide is found most satisfactory.

The Goldschmidt Thermit Company has opened a branch at 103 Richmond street West, in this city. Contracts for welding heavy sections, such as crank shafts, locomotive frames, etc., will be undertaken. At the shops, repairs on small castings, not exceeding 1,000 pounds, will be performed.

The Behrend Dry Concentrator For All Ores.—The ore must be fairly dry, crushed, pulverized and screened to certain sizes, which are determined by the physical conditions. Thus it will be understood that successful concentration depends upon economic capacity, and perfection of the preliminary work to insure high grade effect in the operation of concentrating machines.

The new concentrating machines operate on the principle of air exhaust. The current enters into the lower end between the table and top dressing plate, a point where the concentrates are discharged, the air force, which can be perfectly regulated, carrying with it the lighter gangue matter down into the base of the machine onto baffle boards, and when sufficient weight has accumulated upon a flexible outlet valve, said valve opens and discharges the tailings. The table being rapidly vibrated, the heavier concentrates travel in the opposite direction and are discharged at its lowest end where the air current enters, as above specified. The finer material, dust from the raw ores undergoing dressing, is carried on through with the exhaust air into and through a duct to dust chamber if desired, or into the open air outside of the building.

The machine works entirely on the principle of specific gravity of materials under treatment. By simply lowering the dressing plate, which contracts the space through which the air is drawn, the force is so concentrated that only mineral of the heaviest specific gravity contained in the material can be discharged. The lighter minerals will be carried over as tailings, and these can be run to a second machine for the separation of the next heaviest specific gravity. In this manner the several minerals in concentrates can be readily sparated.

By referring to the outline drawing, Fig. 3, it will be seen the air enters at A, and is carried over the entire surface of the table S, the arrows indicating direction. The tailings discharge at B. The table is under rapid vibration by the eccentric C. The ore is fed into the table through the false bottom and pocket D. The

dressing plate entirely covers the table and, combined, constitutes the air flue. Said plate is moveable in a perpendicular line, which can be raised or lowered, creating a variable air current, according to the gravities of material under treatment, to insure discharge of any degree of concentration desired. The volume of air and ore feed is also under complete control.

The operation of the machine, as before outlined, is very positive and simple. When adjusted to discharge the concentrates, it requires absolutely no attention beyond occasional inspection, to insure continuous and highly efficient work; consequently, it requires no expert ability, merely eyesight. A person of ordinary intelligence could operate 50 machines as efficiently as a man of skill at high wages.

A very important consideration in connection with employment of the Behrend system of concentration is, that a mill of this description can be installed contiguous to the mine, instead of hauling the ore to a mill at some remote place where water is available,

2. Silver-lead ore, baryta gangue from West Cliffe, Col., recovery 90 per cent. lead.

3. Silver-lead ore from Cashier Mining & Milling Company, Boulder County, Co., recovery 90.2 per cent.

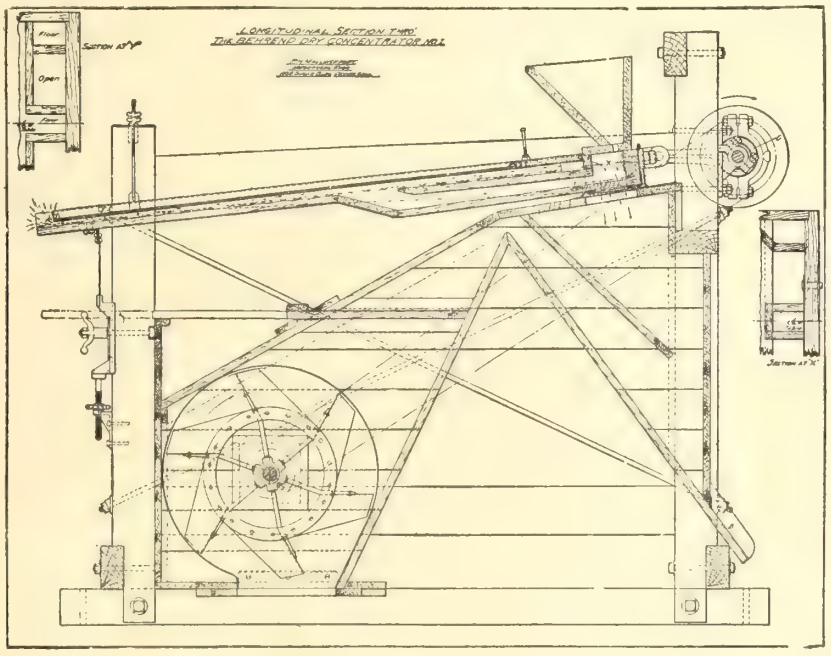
4. Bismuth ore from New Mexico, 95 per cent. extraction.

5. Tungsten ore, Boulder County, recovery, 90 per cent.

6. Tellurium ore, Cripple Creek, Col., value $5.25 per ton, recovery 75 per cent.; value of concentrates, $65 to $172.

7. Canadian corundum; extraction 75 per cent.

8. Ore, silver sulphides, gangue of quartz and baryta, which had never been concentrated to any commercial degree by any system; recovery 75 per cent. From various sizes operated upon the following products and values were obtained from "mill dirt" having an average value of 24 ounces silver per ton: 201.68 ounces per ton, 242.60 ounces per ton, and 440.56 ounces per ton.



frequently imperative in any country, at a cost which would make the difference between profit and loss.

The capacity of the concentrating machines is eight to fifteen tons, according to sizes operated upon, in 24 hours, the average being twelve tons. The weight of a machine is 500 pounds, and it can be transported to almost inaccessible places in mining districts. The floor space required is 3½ by 6 feet. Power required is ½-horse power.

The advantage to be derived by employment of the Behrend concentrators in only one phase of the system, is excess extraction, or higher degree of concentration over the wet system. Comparative tests showed gains of 10 to 30 pr cent. at less cost.

The following record of work done by the Behrend concentrators represents only a few of the incidental tests made:

1. Ore containing lead, 9 per cent.; zinc, 12 per cent., the other constituents being iron and silica. Results: 70 per cent. lead concentrates, the iron carrying less than 1 per cent. lead, about 3 per cent. zinc, and the zinc product was brought up to 40 per cent.

The above tests were made on "mill dirt" from tunnels, drifts, stopes and dumps of the Blue Bird mine, Grand Island district, Boulder County, Co.

A testing plant under the Behrend system is maintained at 48½ Inspector street, Montreal, Que., where the machine can be operated on all ores.

STIBNITE IN FRANCE.

The auriferous stibnite of Martigne-Ferchand, France, occurs in a greenstone dyke which courses through black and yellowish-brown, fine grained, porous quartzites. The dyke is 33 feet wide. It can be traced for nearly a mile. The stibnite contains 0.0009 per cent. gold, and the ore also includes arsenical pyrites carrying 0.0008 per cent. gold, iron pyrites, limonite, and occasionally a little native gold. The gangue consists chiefly of quartz and calcite, with some brown spar associated. Vugs and druses, occur frequently. The lodes are probably the infilling of contraction-fissures in the greenstone. The industrial importance of the Martigne stibnites is much lessened by the arsenic present.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The referendum vote of the members of the P. W. A. has come and gone, and the result was a small majority in favor of the American organization. The total eligible membership was 10,000, so it is said, but of this only about half cared sufficiently about the matter to go to the poll. The character of the vote is interesting, varying according to the locality. Pictou county, as one would expect of the descendants of so distinguished an ancestry, went solid for the native organization. Cumberland county, who are without doubt the Athenians of Nova Scotia, desired a change. In the Glace Bay district it was noticeable that at those collieries that have traditions and are come of age the vote was for the Canadian body. At the more youthful collieries it was the reverse. It can hardly be said that a majority of 500 out of a vote of 10,000 is at all conclusive, especially when one considers the energy that was displayed by the U. M. W. A. advocates and the apathetic indifference manifested by the rank and file of the P. W. A. So for the nonce. like the man in the song, "we dunno where we are."

One well known text book on mining, in its introduction, lays down the axiom that a colliery "the conditions are never ideal." which same is most true. During the first half of June it looked as if the mines of the Dominion Coal Company were going to beat all records, and reach a mark that would stand for a long time, but they didn't. The output was 343,000 tons, which is about 4,00 tons less than that of October, 1907. The reason that the output was not larger was an accident to the haulage engine of Reserve colliery, which laid the mine idle for several days. The Hub mine produced 13,700 tons, and from now on the outputs from this mine will be normal. The Emery mine, No. 10, produced 15,500, the largest output from that mine as yet.

It is surprising what remarkable statements are offered for public consumption, and are meekly swallowed by those who don't know better. A Montreal paper recently quoted some Halifax shareholder of Dominion Steel stock to the effect that "there was not a coal owner in Nova Scotia who would not sell slack at $1.24, if he were sure of a market the year round." We venture to assert that there is not a coal owner in Nova Scotia who could sell slack at $1.24 per ton all the year around and keep clear of the Bankruptcy Court. Such statements are the most arrant nonsense, indeed they are a little worse than nonsense. There was a time in the coal trade when slack was a drug on the market, but it is not so to-day. Modern methods of firing boilers, the use of bye-product ovens, and other contributory causes have put slack on about the same footing as runmine, indeed there are many firms who buy runmine, and afterwards crush it to slack, as they prefer it that way. Improved methods of mining make less slack, and it is a far cry to the old days when thousands of tons of valuable coal were left in the mines in the form of riddled slack at the time when miners were paid for round coal only. But even if slack were a difficult thing to sell it could not be sold at $1.24. If anyone doubts this, let him try to buy it in Nova Scotia at that price, and his doubts would quickly vanish.

No. 12 Colliery is emerging out of chaos. The bankhead foundations have been excavated, concrete culverts laid down. and the concreting of the air shaft is about completed. Several of the permanent colliery buildings are already erected, and altogether a good deal of construction work has been done during the recent fine weather, considering the difficulty of transporting material before the completion of the railway branch.

Mr. Dennis, of the Geological Survey at Ottawa, has recently visited the mines of this neighborhood, and taken samples of the coal coming over the screens ot different collieries. This has been done for the purposes of the admirable work now being carried on by the staff of the McGill University, under the direction of Dr. Bonsall Porter, namely the determination of the commercial worth of all Canadian coals, and a classification of their analyses, washing tests, boiler tests, etc., similar in character to the monumental work of the Coal Testing Bureau at the St. Louis Exposition some time ago. The various and numerous samples of Canadian coals that are awaiting treatment in the buildings of McGill is an eloquent commentary on the wealth of the Dominion in commercial coals. When the work the McGill people are now engaged on is completed it will afford a very valuabel mass of data of a kind that has never previously been collected in Canada, and its publication will be awaited with considerable interest.

ONTARIO.

Toronto.

A representative of the "Canadian Mining Journal" inspected the exhibit of gold ore from the Harris-Maxwell property, Larder Lake, now on view at the office of the Toronto Star.

The ore is the typical silicified dolomite, rusty in spots and seamed with quartz stringers. Disseminated throughout the specimens are iron pyrites, a little chalcopyrite and galena and possibly a little zinc blende. These sulphides occur in small spicules and amount to not more than one per cent. of the total weight of the ore. Visible gold is sprinkled freely along the quartz stringers when they come in contact with the country rock. The specimens on exhibition are rich.

This is an encouraging symptom. While it is by no means to be taken as conclusive evidence of Larder Lake's value as a mining field, the finding of this striking specimen ore certainly justifies continued development.

QUEBEC.

Montreal.

A promising discovery of asbestos has recently been made on lot 16, range 4, township of Thetford, at a distance of about four and a half miles from Thetford Station. Asbestos was known to occur on this lot for several years, but little attention was paid to this until about one week ago when a rich shoot in the southwestern corner of the property was located. The quality appears to be the same as found in the Thetford and Black Lake mines. Veins measuring one inch and over, yielding an excellent crude No. 1 were found, while veins of smaller width in immediate vicinity cover an area of about 125feet long and 50 feet wide.

On lot 17, the adjoining lot, veins of half inch have been found in the southeasterly part over an area of about 50 by 40 feet.

It is likely that the Robertson serpentine range, which seems to have a large extent is a continuation of the famous Thetford serpentine, which has contributed so largely to the world's output of asbestos for the last ten years. No work to speak of has yet been done on these new discoveries, but judging from the remarks of an asbestos expert who has made lately a thorough examination of these deposits, the districts will in all probability become a producer of fibre of some importance.

Mr. F. M. Whitney, head of the American Asbestos Company at Black Lake, has sold out his interests to the British-Canadian Asbestos Company for a large cash consideration, retaining, however,, $400,000 of shares in a new company to be formed with a capital of $2,000,000. The American Asbestos Company in 1900 took over the property known the Murphy lot, close to the railway works of the Quebec Central, at Black Lake. A mill of a capacity of 500 tons of rock per day was built, which since 1904 has produced as an average continuously about one car load of asbestos fibre and clay. Last year the company bought the old asbestos properties of the Glasgow and the Manhattan, adjoining, and since that time in addition to the mill fibre has produced from 40 to 50 tons of crude per month. The new company will continue operations for the present as heretofore, but innovations and improvements of a large extent are contemplated for 1909.

BRITISH COLUMBIA.

Victoria.

The threatened abandoning of the Kaslo & Sandon Railroad by the Great Northern has aroused strong protests from these places. The Government of British Columbia has acted promptly in support of this protest by sending an official telegram to the Great Northern.

The Kaslo & Slocan Railroad was built under a provincial franchise. A bonus of 400,000 acres of land was given along with other valuable concessions. The land is now worth a great deal. The line runs from Kaslo on Kootenay Lake to Sandon, a distance of about 20 miles. A short branch connects Sandon with Cody, further up the valley.

Recently the train service has been cut to three trains per week. The Great Northern now intimates its intention of cutting off Sandon and Cody altogether by building a Y at McGuigan Siding and running the trains from Kaslo to McGuigan and back. They contend that as two costly bridges have been destroyed by landslides, the Sandon traffic does not justify their replacement.

Should this plan be carried out Sandon would be cut off from communication with the rest of South Kootenay. Slocan is only 21 miles from Nelson. But if the change is made it will be necessary to go round by way of Nakusp, a distance of 125 miles.

In the memorial sent to the Premier by the residents of Kaslo it is pointed out that, while the new arrangement would afford accommodation to the Rambler-Cariboo mine, which ships from McGuigan, and to the Lucky Jim at Bear Lake and to the Whitewater mines, it would cut off direct communication between Kaslo and Sandon for freight, passengers and mails and would deprive all the mines at Sandon of an alternative and competing outlet for ores. Moreover, the Last Chance, American Boy, Sunset, Reco, Goodenough, and other mines tributary to the Cody branch would be forced to haul their ores to Sandon by team, a distance of one to three miles.

Whilst the petitioners admit that the road has not been a paying one since its acquisition by the Great Northern, they draw attention to the large concessions obtained by that railway. In accepting these concessions and in exercising its right of appropriating private lands the Great Northern has incurred corresponding obligations to the Government and to the public. The railway owns a large system of lines in British Columbia and is constantly adding to these. It is not fair that the corporation should be allowed to abandon portions of its undertaking that prove temporarily unprofitable, while retaining the profitable propositions.

The Sandon camp is but now recovering from a period of extreme depression. It is believed that the depression was brought about by accidental causes, such as litigation and management, and not through any exhaustion of ore bodies. The camp, encouraged by the renewed bounty upon lead and by the prospects of a market for zinc ores, is entering upon a new and promising phase. The Great Northern should not be allowed to discourage a renewal of active mining operations.

It is also pointed out that by the proposed change a gap of ten miles will separate Kaslo and Sandon and the industrial, commercial, and domestic relations of eleven years' growth will be ruptured.

It is practically certain that the Government will intervene.

YUKON.

Dawson.

All the Yukon is watching keenly the new method of mining auriferous gravels of the northern creek bottoms, which is being undertaken on the famous Bonanza Creek, a few miles from Dawson. The new method is to hydraulic the bottoms, and carry away the gravel with aid of an electrically driven lift or conveyor, resembling in principle the operation of a chain of buckets on a dredge. It is the first practical test ever made in the north with a conveyor or lift driven with electricity. Similar conveyors on a rougher scale have been driven in this country with steam, but the expense of generating the steam made them impracticable for operating anything but very rich gravels. The Yukon Gold Company, better known as the Guggenheims, are the originators of the electrical process here.

The low cost of power is the mainstay in this undertaking. The power will be used to lift water from a sump hole at the bottom of the conveyor, about fifty feet, to the tailing race, as well as to drive the buckets. The power is generated on Twelve Mile River, 35 miles distant, and brought over the hills by direct trunk wire. Pelton wheels driver by the river water generate the power.

The Guggenheims are planning to have three of the elevators erected this season. The process seems so certain to be a success that the company has not hesitated to make this heavy initial expense, which not only includes the purchase and installation of 100 tons of material to each conveyor, but also the carrying of the water many miles from the head of Bonanza, piping along the creek bottoms, digging of long open cuts, and other expensive incidental work.

Should this creek bottom process prove successful, and to most it seems there is no doubt of it doing so, the venture will be the cause of revolutionizing the methods of working creek bottoms. The conveyors are expected to be superior to dredges from the fact that the conveyors will clean out all overburden and gravel and leave the bottom, so that as much of the bedrock as desirable can be taken up, and the remaining surface cleaned with water, brooms or otherwise, insuring the recovery of all gold in the creek bottom. The dredges, on the other hand, have to work under water, and the working of the bedrock cannot be done nearly so satisfactorily.

One of the new conveyors has all the capacity of a dredge. In general appearance it looks like a huge steel skeleton tower, thirty feet square at the bottom and 12 feet square at the top, with long steel rods running up from each corner, forming the legs or general supports. It is to be mounted on rollers, and can be moved along the creek with aid of winches. As the gravel is washed into the sump by the hydraulic heads, it is caught in a string of buckets, which rotate over a ladder reaching from the bottom of the main frame work to the top, and standing at an angle of 75 degrees most of the way up, and graduating near the top to 45 degrees, before turning the tumbler at the top. Seventy-six buckets each with a capacity of three cubic feet comprise the bucket line. From the base to the top of the elevator is 59 feet. The buckets turn just below the

uppermost part of the frame, and, as they do so, throw the gravel into elevated sluices, of about the same height as the top of the bucket line.

One man standing on a platform at the top of the conveyor has before him several winches, with which he controls every motion of the big machine. Switches at one side will control the electrical motors driving the conveyor, and the pumps, so that the one man literally will be able to start and stop the whole works at will.

The procession of gravel, silt and other material which will be lifted by the buckets will require water equalling a small creek in volume to wash it through the sluices, and properly wash it, dissolve the plastic matter and relieve the gold. The sluices are three feet wide, and three feet deep, have a grade of six inches to 12 feet, and run back 40 to 60 feet from the conveyor, branching so as to distribute the tailings. These sluices, compared with the narrow primative sluice boxes of the sourdough miner, or even the Klondike kings of old make the old specimens appear like pigmies beside a Hercules. The sluices of the conveyor are more like a large flume, and that they virtually are, with the riffles set in the bottom to catch the gold. Through these giant sluices will be poured 14 sluiceheads of water of 50 inches each, a total of 700 inches. This water will be lifted from the sump, and in lifting it a double service will be rendered, namely, clearing the sump of the flow from the hydraulic heads with which the gravels of the creek are being torn down; and in properly washing the gravels.

Two twelve inch pumps, especially designed for this work, will lift the water. Each pump will be driven with a seventy-five horse-power electrical motor, set on a platform in the middle of the conveyor frame. Beside these motors is one of the 50 horse-power motors which will drive the bucket line.

Two giants, with a total capacity of 500 inches, will tear down the gravel, and shoot it along the bedrock into the sump. In addition, there will be some water let in from the Bonanza Creek to ground sluice the muck and otherwise assist the giants. The extra water from other sources than the nozzles is found very essential in hydraulic work. It is needed to give greater volume to the stream in washing down the silt and gravel, as well as in groundsluicing. The total water pouring into the sump from water and nozzles and creek will have to be controlled so as not to exceed 700 inches, the capacity of the two pumps which keep clear the sump. Most of the time water going into the sump will run perhaps somewhat under the capacity of the pumps, thus not overworking the pumps. While it is planned to use but two giants at a time, there will be others supplied, into which the water may be diverted at any time. Each giant will require five sluiceheads of water. The head will be furnished by a drop of 350 from a penstock on the right limit, fed by the water conveyed from above the upper Bonanza dam by the Norwood ditch.

Before starting to work the ground, the claim will be cut in the middle with a bedrock opening, running lengthwise of the creek, and leading into the sump. In this opening will be set a string of steel sluices. Into these central sluices will be washed all the gravel and other moveable material above bedrock, and most of the gold will be caught in these sluices. What is not caught there will go through with the gravel, and be washed in the big sluices after leaving the conveyor buckets. Thus the gravel by the new method virtually is worked over twice in quick succession.

It is expected that it will be possible to work 400 feet up stream from the conveyor with the giants before it will be necessary to move up the conveyor. The gravel at No. 3 above is about 15 feet from surface to bedrock, and has very little overburden. With the width of creek existing there, which is 400 to 500 feet, it probably will be all one conveyor will be able to do to work out one claim of 500 feet in length in a season. This much done, and the bedrock thoroughly cleaned will be quite an accomplishment. As soon as the creek claims are worked, and the bedrock cleaned, the creek tailing then can be dumped promiscuously into the valley, and the tailings will rise mountains high.

Twenty-five to thirty men will be required to attend to the ground and all the works about each conveyor night and day. All being satisfactory, as many conveyors can be supplied along the creek as is consistent with the water supply and the life of the conveyors in proportion to what will be a reasonable number of machines to do the work profitably.

The first of the conveyors has been completed, and the work undertaken this month, but it is not yet to be said to have turned over enough to have been given a thorough test. The plant will run day and night when well started. O. B. Perry, manager of the company, is the originator, it is understood, of the new conveyor. Should it prove a success, many of these conveyors no doubt will be installed in the Yukon country by other companies.

Bob Henderson, discoverer of the first gold in the Klondike valley, and his partner, Bill Forbes, left on the steamer Victorian, the first boat of the year up the Yukon from Dawson, for the Pelly River, where they will prospect this season. They will pole up the Pelly 300 miles, to a locality where they spent much of last summer.

They found gold on many river bars and on a number of creeks on the Pelly last year, and return there confident that a good camp will be opened in that country in time. Bob has many samples of gold from the district, and always has been enthusiastic over that field.

McLeod and others have been prospecting up the Pelly this winter, and it may be that they will have good news. No direct news of the results of the prospecting in the Pelly has been received this spring. Van Vibber and Van Gorder, who live in the last cabin on the last creek, 500 miles up the Pelly, have been expecting to find gold in time. They are so far up the Pelly as to be but a short distance from Findlay River.

Canada may look forward to the Yukon as a future field for the sale of large quantities of first class mining equipment. The country has evolved rapidly from the days when wood fires, and then boilers and hoists were the only apparatus needed in working the ground for the placer deposits. Quartz mining is beginning, but placer is yet the chief industry. Scores of extensive large method mining plants have been installed in the Klondike since the region began to evolve from the old conditions of individual operation. The investment in dredges and hydraulic equipment have reached many millions, and this line of enterprise seems scarcely more than begun.

In connection with the dredges extensive outlay has been necessary for steam and water power plants, for generating of electricity, with which the dredges are driven. For each hydraulic plant long ditch lines often are necessary, necessitating in many instances extensive outlay for pipe material for syphons, to say nothing of the need of hydraulic giants and the other parts aside from lumber for flumes, penstocks and such.

The new style of electrically driven elevators or lifts for handling tailings from ground being worked by hydraulic on the creek bottoms also calls for extensive mechanical equipment. The frame work of the lifts are entirely of steel, and carry a steel bucket line, similar to a dredge, and are equipped with two large centrifugal pumps to each lift, for handling of water from the sump to the tailing boxes. The hydraulic giants used for washing the gravel down to the lifts are akin to the hydraulic plants used in the operations on hills.

The electrical equipment for conveying power is one of the biggest items of expense. Lines from a quarter of a mile to sixty miles long are installed already conveying power, and heavy wire, and transforming stations add to the quantity of equipment materially. In connection with each such line also is the generating equipment in form of dynamos driven by turbines or steam plants.

Some of the dredges are supplied with power from steam boilers aboard the craft, but the larger concerns have their steam or water power plants ashore, and electrical lines with which to convey the electricity to the dredges. The several big companies branching out are planning the installation of extensive power plants of most modern character. The power will be generated largely from the vast natural water courses, and conducted over hills and valleys with copper wires. In some instances there are plans to generate power at the coal mines, so as to avoid hauling the coal, and to transmit the power by wire direct from the mines to the place of consumption.

The many new hill groups organized for working on hydraulic plans will be demanding much more new equipment before long. Flumes, ditch line and pipe line material and giants and such will come largely into demand as a consequence.

The prospecting of the dredge ground also makes a demand for more modern equipment, in the way of large drilling machines. The keystone drill is the favorite for this purpose in the Yukon, and no less than ten are in use within ten miles of Dakson. These drills cost laid down at Dawson $3,000 and $4,000 each.

The dredges in use in the Klondike camp cost on the average $140,000 to $150,000 each, completed on the spot ready for starting. Of this cost approximately one-third is represented in the the purchase price of the machinery at the factories. The remainder is for lumber, transportation and labor.

The fleet of dredges now in operation within 75 miles of Dawson including the following:

Dredge No. 1 at mouth of Bonanza, working on claim 104 below discovery, owned by Guggenheims.

Dredge No. 2, on 104 below on Bonanza, owned by Guggenheims.

Dredge on 90 below discovery, Bonanza, owned by Guggenheims.

Dredge No. 91, Bonanza, owned by Guggenheims.

Dredge at mouth of Hunker, owned by Guggenheims.

Dredge on Anderson Concession, Hunker, owned by Guggenheims.

Dredge on 37, Hunker, owned by Guggenheims.

Dredge at mouth of Bear Creek, owned by Canadian Klondike Mining Company.

Dredge at mouth of the Klondike River, owned by the Bonanza Basin Gold Dredging & Mining Company.

Dredge on Bonanza, owned by the Lewis River Dredging & Mining Company.

Dredge on Indian River, owned by Indian River Gold Mining Company.

Dredge on lower Forty Mile River, owned by the Consolidated Gold Mining Company of Alaska.

Dredge at Boundary on Forty Mile River, owned by Consolidated Gold Mining Company of Alaska.

Dredge on South Fork of Forty Mile, owned by Mosier & Company.

Dredge on lower Walker's Fork of the Forty Mile River, owned by the Gold Scoopers' Company.

Dredge on upper Walker's Fork of the Forty Mile River, owned by Russell King and associates.

In addition to this is a dredge being assembled at this writing at Whitehorse for operation this season on the Stewart River by the Yukon Basin Gold Mining Company. The same company is planning the installation of several more dredges in subsequent seasons.

Several other large dredges also are being planned by other companies.

The hydraulic plants being operated near Dawson this season include:

Two giants on Acklen Group, right limit of the Klondike, opposite the mouth of Bonanza, 700 inches, owned by Guggenheims.

Two giants on Paradise Hill, left limit of Hunker, using 300 inches, owned by Guggenheims.

Two giants on Solomon Hill, left limit of Bonanza, using 400 inches, owned by Guggenheims.

Two giants on American Gulch, left limit of Bonanza, using 500 inches, owned by Guggenheims.

Two giants on Bunker Hill, right limit of Bonanza, using 500 inches, owned by Guggenheims.

Two giants on No. 3, above Bonanza, hydraulicking creek bottom into electrical lift No. 1, owned by Guggenheims.

Four giants on Adams Hill, owend by Bonanza Creek Hydraulic Company.

Seven giants on French Hill, left limit of Bonanza, owned by Detroit-Yukon Mining Company.

Plant on Whiskey Hill, right limit of Hunker, operated by Blanchfield & McCrimmon.

Plant on Whiskey Hill, operated by Joe Burke.

Giant on Paradise Hill, owned by Bert R. Elliott.

Giant on Delhi Hill, operated by Delhi, Rice & Peterson.

Plant on Temperance Hill, Hunker, operated by French Syndicate.

Giant on Temperance Hill, Hunker, operated by August Larson.

Plant on Temperance Hill, Hunker, operated by August Larson.

Plant on hill opposite Bee Gulch, operated by Detroit-Yukon Company.

Plant on Nugget Hill, opposite 55 below, operated by Gould & Murphy.

Four monitors, with 800 inches, working on Treasure Hill, Hunker, owned by Dolan & Tackstrom.

Two giants on left limit of 3 and 4 Last Chance, owned by Collins & Eilbeck.

Two giants, opposite 2 and 3 below on Hunker, operated by Jim Younkins.

Two giants opposite 9 below, Last Chance, operated by Jack Day.

Two giants opposite 6 above the mouth, left limit of Last Chance, owned by Jim Wilson.

Plant on Last Chance, operated by Rogers & Holland.

Plant on Goring Creek, opposite upper Hunker, owned by Miles, Grey and Cunningham.

In addition to the foregoing are several plants operating on Lovett Gulch and other points along Bonanza and Hunker by individuals whose namee are not known.

In the Forty Mile country hydraulic work also is being undertaken by quite a number.

On Ballarat Creek, above Dawson, the Consolidated Company of Alaska has several giants.

Thistle Creek also has some hydraulic plants in course of installation.

On Barker Creek, a tributary of the Stewart, Graham and partner are installing a plant. The ditch is completed.

Hydraulic work also has been carried on quite extensively on the French Syndicate's ground on the Sixty Mile.

The N. A. T. & T. has an extensive hydraulic plant, long ditch and hydraulic lift on Miller Creek. The company also is clearing the ground there for dredge purposes.

Many large hills in the Klondike camp are being prepared for operation by hydraulic methods.

In the Circle district, at Rampart, Hot Springs, which are on the lower Yukon, hydraulic plants have been undertaken on extensive scale. These three districts are among the most important in the Yukon basin.

On the extreme upper Yukon waters are the tributaries of the Big Salmon, where plants are working on several creeks, including Livingstone, Cottoneva and other streams.

In the Atlin district, the waters of which are tributary to the Yukon, hydraulic work, with many large flumes and ditches, has been under way for years. Dredges and steam shovels also are used there.

The Klondike's new hydraulic plants will include the several to be fed by the mammoth ditch now being completed at a cost of five to ten thousand dollars, sixty miles over the hills from Twelve Mile River to the high levels of Bonanza and Hunker. Much of this water will be used to feed electrical conveyor plants.

The first of the electrical conveyors has been installed on Bonanza at a heavy cost, probably about $50,000, and containing 100 tons of machinery and steel frame materila. Two more of the plants are to be installed on Bonanza this season. Part of the machinery for the two plants is on the ground. The Guggenheims own the big ditch and the conveyors. The ditch will carry 5,000 inches of water.

The hydraulic and dredging mining has been under way in Klondike not more than three years, that is on anything more than a limited scale, and while millions have bee nexpended in ventures of this kind already, the working here by this method is barely begun.

The tailing heaps from the hydraulic plants are becoming decidedly noticeable on Klondike creeks. The immense quantity of gravel handled by the giants as in comparison with the old methods employed by the early miners affords a sharp contrast in size of tailing piles. Near discovery on Bonanza the tailings from off the left limit extend the full width of the creek, and are being banked high above the creek level with brsuh buttresses. The sheer rise on the outer edge makes a picturesque spectacle. The green brush lends a sharp contrast in color to the white mass of gravel showing on the surface. Over the whole spreads the stream of water from the sluices, carrying the gravel and sediment to all parts of the huge pile. There is no telling how high these brush walls will have to be built. Already they are 10 to 30 feet high, and the tailing pile, extending lengthwise of the creek feet, makes an imposing pile.

At the mouth of Eldorado is another huge tailing pile, extending the width of the creek, leaving a narrow place at one side for the water of the stream to pass.

As soon as the creek bed of Bonanza is worked out with dredges or electrical ifts, the building of bulwarks to retain tailings no longer will be required, and the tailings from the hills will be thrown over the brow of the hills into the creek bottoms with little trouble in keeping clear any space below unless it be merely sufficient opening for the water to pass down stream without backing up high enough to damage the road.

GENERAL MINING NEWS.

ONTARIO.

Toronto.—Government bounties during April were paid on 43,118 barrels of petroleum produced in Southwestern Ontario.

The Court of Appeal for Ontario has delivered judgment dismissing with costs all three appeals from the judgment of Chief Justice Meredith in the case of Crawfod vs. the Lawson Mine, Limited, and McLeod vs. Crawford. These two actions were originally brought in connection with the long disputed title to the famous Lawson mine. Mr. Crawford demanded certain rights in connection with the Lawson mine, and Mr. Duncan McLeod and others interested in the property proceeded against Mr. Crawford and Samuel R. Clark, to enforce an agreement of settlement made April 6th, 1907.

The judgments of the Chief Justice were not satisfactory to the litigant, and three appeals were made to the Court of Appeal. One was by Thomas Crawford in connection with the dismissal of his action against the Lawson Mines, Limited, and John McMartin. Another was brought by Thomas Crawford and Samuel R. Clark, against the judgment in favor of the plaintiffs in the other action, and the third by the same defendants against the judgment in favor of Messrs. Millar & Bedells upon their counter-claim. All the appeals were heard together, the argument occupying more than three days. Their Lordships reserved judgment in order to afford an opportunity for perusal of the voluminous exhibits in connection with the case.

The judgment says: "It is needless to repeat the reasoning of the learned Chief Justice that the agreement was not capable of bing enforced, because it purports to be made with a company not in existence. But it may be pointed out that the agreement of the 3rd of April did not alter the relation of Thos. Crawford as a trustee of the land for himself, Murdoch McLeod, Donald Crawford and John McLeod, or their representatives."

The judgment repeats several other findings, and concludes:

"For these, as well as for the reasons given by the learned Chief Justice, the appeals in the action of McLeod vs. Crawford fail and must be dismissed. And it follows that the appellant, Thomas Crawford, had no ground for the action instituted by him against John McMartin, and that it was rightly dismissed at the trial.

"All three appeals are dismissed with costs."

Ottawa.—Hon. Mr. Fielding has given notice of the following resolution in the Commons: "That it is expedient to provide that the bounty of one-half cent per imperial gallon on crude petroleum from Canadian wells, authorized by the act of 1904, shall apply to crude petroleum produced from shales or other substances mined in Canada."

Cobalt, July 8.—The "blind pig" will soon be a thing of the past. The authorities have awakened. For two days the local police court has been kept busy. Fines ranging from $50 to $150 and a total of $1,750 have been imposed. Forty "blind pigs" have been struck and seventeen convictions resulted.

Cobalt Lake.—Bulletin of progress, Cobalt Lake Mining Company:

Mining.—The drift in the north shaft is out underneath the lake a distance of 45 feet. This machine during the month drilled 33 feet and cut out the level station, and in addition the lower portion of the shaft has been timbered and planked and a substantial head frame erected over its mouth.

No. 4, 1st Level.—The north crossent is now in 377 feet from No. 3 or 480 feet from the drift on No. 4, making the driving for this machine during the month 59 feet and in addition this machine sunk a winze on the No. 3 vein to a depth of 10 feet and is also responsible for a proportion of the ore broken down during the month. The ore broken during the month amounted after cobbing to 46 tons, most of which was broken by the

"baby" machine. A crosscut to the south is now in a distance of 522 feet, making the driving for this machine for the month 62 feet.

Second Level.—The west drift is now out underneath the lake a distance of 259 feet, and in addition this machine drove 12 feet to the east from the north crosscut and upraised 4 feet, making 36 feet feet of footage for this machine for the month.

No. 6—The north drift is now out 87 feet and the east drift 34 feet, making 76 feet of driving for this machine for the month.

Our total footage during the month was 306 feet.

(Signed) E. L. Fraleck.

P.S.—The ore bagged this month consists of 1½ tons of first grade silver ore, 30½ tons of cobalt ore and 6 tons of cobalt ore, a total of 46 tons. We have on hand at the present time 27½ tons of silver ore, 12 tons of second grade silver ore, 85 tons of cobalt ore and 32 tons of niccolite, making in all 156½ tons.

We purpose shipping out a car of first grade silver ore on Monday, and also expect to ship one car load of cobalt ore on Tuesday, to the same parties os we shipped the last one and on the same conditions

(Signed) D. B. Rochester.

NOVA SCOTIA.

Halifax.—June 24 was the day appointed for the 10,000 voters of the P. W. A. to decide whether that organization would remain an inedpendent entity or be merged in the U. M. W. A. A large vote was expected; but only slightly more than one-half of the possible votes were polled. Incomplete returns gave the U. M. W. A. a majority of 400.

Sydney.—Rumors are current that the Harmsworths are negotiating for the purchase of the Buchell coal areas at New Campbellton. The areas comprise five or six square miles near the entrance to Big Bras d'Or Lake. Several miles of submarine areas are also included. The Harmsworths are taking up the matter with a view to securing cheap fuel for their Newfoundland pulp enterprise.

Stellarton.—The Intercolonial Coal Company has discovered by boring a new seam of coal within the town limits of Stellarton.

Westville.—A fatal accident occurred at the Drummond Colliery on June 17th. A fall of rock instantly killed Duncan MacMaster.

Port Hood.—As a result of test boring near the Seaside Wharf the Port Hood-Richmond Railway Coal Company has struck the overlying 8 foot seam. This was cut at a shallow depth. The seam was exposed many years ago but was covered by drift. Old inhabitants remember when the outcrop was visible. Sand washed in from the bar covered it, and until now it has been but a tradition.

Truro.—Near Moose River gold mines, Halifax County, scheelite has been found in drift. Areas have been taken up and parties are prospecting for the mother lode.

BRITISH COLUMBIA.

Fernie.—James Ferguson was instantly killed at Michel, No. 5 mine, of the C. N. Pass Coal Company, on Friday, July 3rd. Loaded cars broke loose and the unfortunate man was killed instantly.

Greenwood.—Mr. P. J. Roosa has been appointed manager of the Dominion Copper Company's mines and smelter in succession to Mr. W. C. Thomas, who has accepted an appointment in Utah. Mr. Roosa was for five years Mr. Thomas' chief of staff. He has the confidence of the community. Mr. John Cawile is to be general foreman of the smelter. There are no changes in the list of mine officials. The 750 ton furnace was blown in on the 28th of June. The two small furnaces will not be blown in until an up-to-date electric feed process is installed.

Vancouver.—The discovery of a belt of copper ore at Tasso Harbor, Queen Charlotte Islands, has been reported here.

Victoria.—A well authenticated report has it that negotiations are in progress for the purchase of the Wellington Collieries, controlled by Lieut.-Governor Dunsmuir. John Arbuthnot, ex-Mayor of Winnipeg, and Luke Wishart, of New York, are concerned in the transaction. The consideration is said to be upwards of $5,000,000.

Atlin.—In spite of the desertion of this camp by the Guggenheims there is every prospect of a good clean-up for the season. On Pine Creek the North Columbia Hydraulic will operate, and on McKee Creek the McKee Creek Consolidated will be active.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The North of England Branch of the National Association of Colliery Managers have submitted to the general body a resolution favoring the establishment of a rescue station in some central position for Durham and Northumberland mines. They embodied with it an expression of opinion that the practical possibilities of the use of breathing apparatus were being exaggerated to a degree which might prove dangerous.

Many extensions and new enterprises in connection with the development of the Northumberland coal fields are reported. Shipments from this field have greatly increased and the output for the first six months of the year will probably be a new record.

FRANCE.

The Societe de l'Industrie Minerale, the most important mining and metallurgical association in France, celebrated its jubilee anniversary held by a congress at St. Etienne from June 14th to June 20th, which was attended by 436 engineers. Visits were paid to leading collieries and steam works. Mr. Bennett H. Brough presented a congratulatory address from the British Iron and Steel Institute.

Nine miners were suffocated in the Montmartre No. 2 pit of the La Loire mines near St. Etienne, on June 22nd. They were engaged in constructing barriers against a fire which had broken out in the mine and the ventilation was cut off.

RUSSIA.

The extensive Briansk iron and steel works in South Russia, principally owned by French capitalists, have closed down indefinitely.

By a fire, which broke out on the 3rd inst., at the Rikovsky mine, Yusovo, followed by an explosion of gas, over 200 miners

were killed. The rescue work, which resulted in saving many of those in the mine, was conducted under great difficulties, six of the rescuers being among the victims.

SPITZBERGEN.

The coal mines worked by the Trondhjem American Spitzbergen Coal Company have been extended and deepened and regular workings will be begun in August. The Anglo-Bergen Company mined 4,000 tons during the winter and will supply the Norwegian State railways and sell to steamship companies in Norway.

AUSTRALASIA.

Mr. Menzies, the discoverer of the Menzies gold field in Western Australia, prospecting in the northern territory of the Commonwealth, has discovered tin deposits of value on the Fitzmaurice fall of the table-lands country. Specimens show over 70 per cent. of tin.

A new copper field is being opened up at Mount Balfour, on the northwest coast of Tasmania, where work has been undertaken at several points.

Mr. H. Y. S. Brown, Government Geologist of South Australia, states that 21,000,000 tons of iron ore averaging 66 per cent. iron and manganiferous iron are in sight at Tron Knob, 40 miles from Port Augusta.

The mines at Broken Hill, New South Wales, are rigidly economizing in view of the decrease in metal values. Staffs are being reduced and development restricted.

UNITED STATES.

At the San Antonio mine in the Red Mountain district, Colorado, a body of copper ore 30 feet long by 25 feet wide has been found, giving every indication of being persistent in depth.

A large number of zinc mines in the Joplin, Missouri, district, have been closed down owing to the expense of keeping them free from water and the present low price of zinc. Some of the mines are installing better pumping machinery.

Copper production in the Butte disteict of Montana will show a considerable falling off on account of floods. About 7,000 men are employed in the Amalgamated mines, the output of which is about 8,500 tons of ore per day. The Great Falls smelter of the Boston & Montana Company, which was greatly damaged by flooding, is likely to be out of commission for some time.

The School of Mines building of the University of Nevada at Reno, the gift of Clarence H. Mackay and Mrs. John Mackay, which cost $750,000, was dedicated last month. Mr. Mackay also promises an endowment fund for salaries.

CHINA.

A mining company has been formed with $2,000,000 capital to work the iron, coal and galena mines near Okran, the principal stockholders being Chinese in Hong Kong and Singapore. The project includes the erection of smelters and a narrow gauge railway to tide water.

PHILIPPINE ISLANDS.

Gold dredging appears likely to become a profitable undertaking, as there are large tracts of alluvial gold-bearing land, which preliminary tests indicate to be worth working. About 80 ounces gold valued at £300 were recently sent down from the Paracale district.

MEXICO.

An explosion in a mine belonging to the Mexican Coal & Coke Company killed twenty Mexican and Japanese miners.

The enactment of the proposed new mining law excluding foreigners from acquiring mining properties has apparently been indefiinitely postponed.

STATISTICS AND RETURNS.

The output of the Dominion Coal Company's collieries for June is estimated at 347,000 tons. This would bring the total output for the half year up to 1,924,619 tons, or an increase over the corresponding period a year ago of 170,899 tons, which, on the whole, is a very satisfactory showing.

Mr. James Ross in London stated the year's output will be close to 4,000,000 tons and at the present rate that figure will be reached.

The output by months is as follows:

	1908. Tons.	1907. Tons.
January	314,108	252,248
February	285,649	225,988
March	346,529	212,831
April	298,745	316,384
May	332,588	327,269
June	347,000	319,000
Total	1,924,619	1,653,720

The output of the Crow's Nest Pass collieries for the week ending July 3 was 17,957 tons, a daily average (five days) of 3,591 tons. All collieries were idle on Dominion Day. Week ending July 5, 1907, 17,748 tons; daily average, 3,549 tons; week ending July, 1906, 11,692 tons; daily average, 2,923 tons.

The corrected returns, by collieries, of the Dominion Coal Company's outputs are as follows:

OUTPUTS—JUNE, 1908.

No. 1 colliery	52,316
No. 2 colliery	66,851
No. 3 colliery	36,052
No. 4 colliery	38,836
No. 5 colliery	39,758
No. 6 colliery	23,178
No. 7 colliery	13,665
No. 8 colliery	21,384
No. 9 colliery	35,339
No. 10 colliery	15,527
	342,906

Shipments from the collieries of the Cumberland Railway & Coal Company, Springhill, N.S., for the month of June were 29,041 tons.

COBALT ORE SHIPMENTS.

Shipments of ore from the Cobalt camp for the week ending June 27th totalled 820,270 pounds, or 405 tons, divided among eleven mines.

	Week ending June 27.	Since Jan. 1.
Buffalo	42,680	696,390
Coniagas	63,210	631,890
City of Cobalt	116,400	568,510
McKinley	58,120	1,615,280
Nipissing	62,400	2,045,400
O'Brien	63,320	3,008,740
Right of Way	60,480	363,770
Temiskaming	120,000	445,000
Tretheway	133,500	1,264,226
Watts	60,160	306,180

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:

	Week ending July 4.	Since Jan. 1.
Buffalo	.....	696,390
Coniagas	.....	631,890
Cobalt Lake	.....	246,455
Crown Reserve	.....	84,000
Cobalt Central	.....	156,380
City of Cobalt	46,870	615,380
Drummond	.....	188,600
Foster	.....	238,400
Kerr Lake	.....	462,300
King Edward	.....	127,240
La Rose	62,240	2,508,562
McKinley	120,000	1,735,280
Nipissing	111,340	2,156,740
Nova Scotia	.....	271,545
Little Nipissing	.....	40,110
Nancy Helen	.....	140,420
O'Brien	212,730	3,221,470
Right of Way	.....	363,770
Provincial	.....	143,210
Silver Queen	.....	634,510
Silver Cliff	.....	52,000
Silver Leaf	.....	196,620
Townsite	54,600	130,700
Temiskaming	100,000	545,000
Temiskaming & H. B.	60,000	724,000
Trethewey	108,180	1,372,406
Watts	.....	306,180

The total shipmetns for the week were 866,960 pounds, or 433 tons. Total shipments from January 1st are 18,220,348 pounds, or 9110 tons.

Of the shipments for the week ending July 4th 147,850 pounds went from the Obrien mine to the Deloro smelter. The same mine shipped 64,880 pounds to Denver.

La Rose shipped 62,240 pounds to the Anglo-French Nickel Company, Swansea. The Copper Cliff smelter received 45,600 pounds from the Cobalt Townsite and 16,870 pounds from the City of Cobalt mine.

BRITISH COLUMBIA ORE SHIPMENTS.

The shipments from the mines and the receipts at the smelters of the districts of Southeastern British Columbia for the week ending June 27 and year to date were as follows:

Ore Shipments:

	Week.	Year.
Boundary	32,423	570,051
Rossland	5,396	137,200
East of Columbia River	1,330	47,713

The total ore shipments for the past week were 39,149 tons, and for the year to date 754,964 tons.

Smelter Receipts:

	Week.	Year.
Grand Forks	22,011	522,823
Greenwood	11,089	48,005
Trail	5,241	133,502
Northport (Le Roi)	1,450	41,358
Marysville	.....	5,730

For the week ending July 4th:—

Boundary:	Week.	Year.
Granby	20,522	543,345
Mother Lode	5,940	40,170
Oro Deloro	1,190	13,666
Rawhide	1,500	1,506
Sunset	450	450
Brooklyn	104	104
Mt. Rose	45	45
Other mines	...	522
Total	29,751	599,802
Rossland:		
Centre Star	1,815	85,469
Le Roi	1,540	39,978
Le Roi No 2	645	15,099
Other mines	...	552
Total	4,000	141,098
Slocan-Kootenay:		
St. Eugene	600	10,375
Whitewater	143	512
Whitewater, milled	280	7,420
Poorman, milled	185	5,850
Queen, milled	185	4,800
North Star	34	1,428
Richmond	72	957
Arlington, Erie	70	810
Rambler Cariboo	20	688
Sunset	42	166
Westmount	44	91
No. 1	14	14
M. & H.	10	10
Other mines	...	16,389
Total	1,764	49,477

The total shipments for the past week were 35,518 tons and for the year to date 790,377 tons.

SMELTER RECEIPTS.

	Week.	Year.
Granby	20,522	543,345
B. C. Copper Co...	7,751	55,756
Dominion Copper Co...	2,099	2,099
Trail	5,603	139,105
Le Roi, Northport Wash .. .	1,690	43,070

The total smelter receipts for the past week were 37,665 tons and for the year to date 789,105 tons.

According to the estimates of Kaffir houses in London, the June output of Transvaal gold falls below May, which was the high record, but was above every other month except March. The output was 570,000 ounces fine. In May it was 581,992 fine ounces. The value of the June output, calculated on the basis of the above estimate, compares as follows:—June, 1908, $12,112,000; May, 1908, $12,360,000; April, 1908, $11,924,000; March, 1908, $12,210,000; February, 1908, $11,510,000; January, 1908, $11,900,000; June, 1907, $10,780,000; June, 1906, $10,109,000; June, 1905, $8,757,000; June, 1904, $6,546,000; June, 1903, $5,062,000; June, 1902, $3,032,000.

The imports of zinc ores into the United States for the first five months of 1908 amounted to 10,900 tons, of which 5,796 tons were classified as dutiable.

COMPANY NOTES.

A half-yearly dividend of three and one-half per cent (3½ per cent.) has been declared on the preferred stock of Dominion Coal Company, Limited, payable on August 1st, 1908, to shareholders of record at the closing of the books on July 31st, 1908.

Transfer books of the preferred stock will be closed from July 21st, at 3 p.m., until August 1st, at 10 a.m.

Sir George Drummond and Mr. E. S. Clouston have resigned from the Cumberland Railway & Coal Company, and two new directors were elected at the annual meeting.

The new directors are Mr. Percy Cowans, of McDougall & Cowans, members of the Montreal Stock Exchange, and Mr. J. D. Hayden, of Cobourg.

Sir Geoorge Drummond was president of the company, and is succeeded by his son, Mr. Huntley Drummond.

Mr. Edgar Macdougall was elected vice-president, and Messrs. David Maurice, W. J. Maurice, J. R. Cowans, G. L. Cains, W. G. Crossen, P. P. Cowans and J. D. Hayden, directors.

Mr. J. R. Cowans was elected general manager, and E. Laflamme secretary-treasurer.

This company has its properties at Springhill, N.S., and in Cape Breton, the coal areas in the latter place being leased recently on a royalty basis to the Dominion Steel Company.

A report submitted by an outside expert shows the properties to be in splendid shape.

Bell's Asbestos Company, Limited, have declared an interim dividend of 1s per share free of income tax for the half year ending 30th June, being at the rate of ten per cent. per annum, payable by warrant on and after the 1st August to the shareholders on the register on the 23rd proximo.

The share transfer books will be closed from the 23rd July to the 30th July, both days inclusive.

MARKETS REPORTS.

Coke.

July 7th—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt, $1.55 to $1.60.
Furnace coke, prompt, $1.90 to $2.

Pig Iron.

July 7th—Pittsburg—
No. 2 foundry, $15.50 to $15.90.
Bessemer, $16.90 to $17.15.
Basic, $16.15 to $16.40.
Malleable, $15.90 to $16.40.
Southern No. 2, $16.40 to $16.90.

Other Metals.

July 7th—
Tin, Straits, 27.65 cents.
Copper, prime Lake, 12.80 to 12.90 cents.
Lake, arsenical brands, 12.75 cents.
Electrolytic copper, 12.70 to 12.80 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.50 cents.
Spelter, 4.475 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.50 to 8.60 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $25.50 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $43 per 75 pound flask.

Silver Prices.

	New York Cents.	London. Pence.
June 24	54⅝	25 3-16
June 25	54¾	25¼
June 26	54¼	25
June 27	53¾	24¾
June 29	54	24⅞
June 30	53⅝	34¾
July 1	53½	25 11-16
July 2	53¾	24 13-16
July 3	53¾	24 13-16
July 4	..	24 13-16
July 6	54	24⅞
July 7	53¾	24 13-16

MARKET NOTES.

The average prices of copper for the past 14 months stood as follows:—1907—May, 25.21; June, 24.375; July, 23.35; August, 20.92; September, 16.75; October, 14.12; November, 14.105; December, 13.65. 1908—January, 13.935; February, 13.33; March, 12.08; April, 12.90; May, 12.90; June, 12.95.

The highest figure recorded during that period was 26.125 on May 29th, 1907. The lowest was 12.68, reached on several occasions throughout February and March, 1908.

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769 Maps of principal mineral localities. Scale 16 m. = 1 in. A series of map sheets, 4 m. = 1 in., covers the Province.

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Iron inlarge bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and in other forms; zincblende, galena, pyrite, mica, graphite, corundum, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HON. FRANK COCHRANE,
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Toronto, Canada.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and Europe is invited to the

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver, $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

HON. MINISTER OF MINES

Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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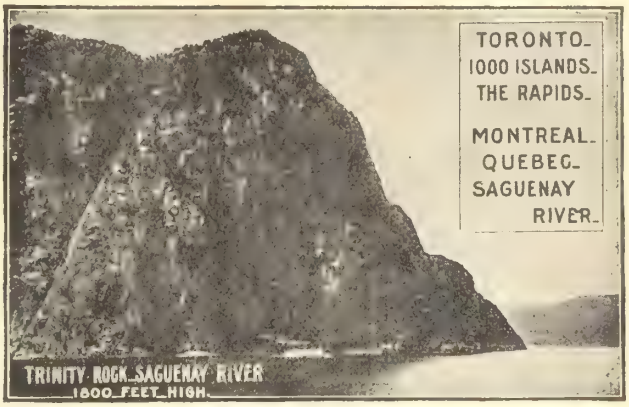
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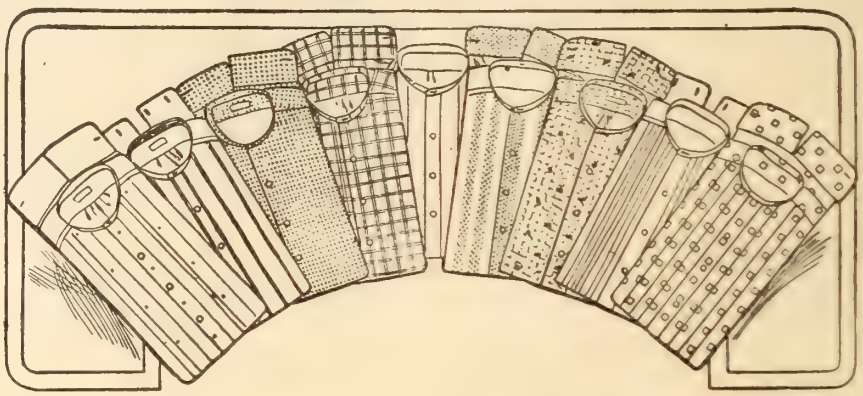
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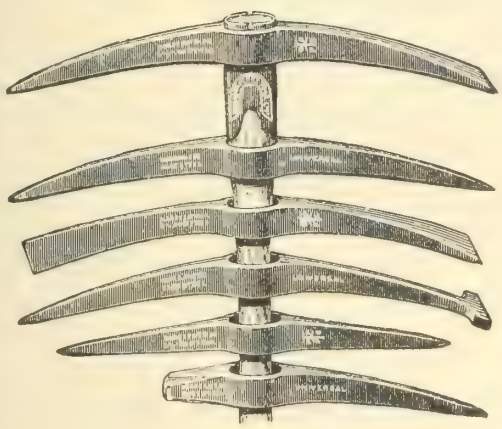
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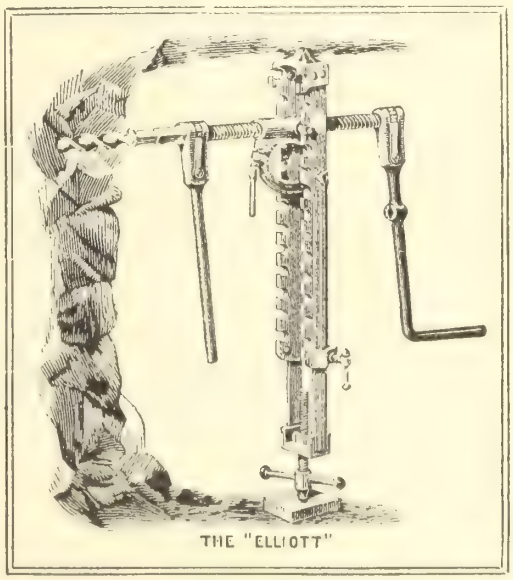
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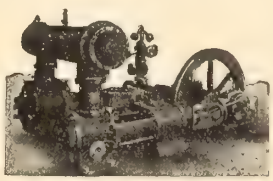
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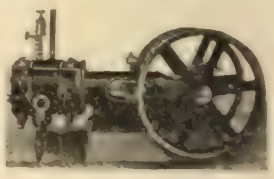
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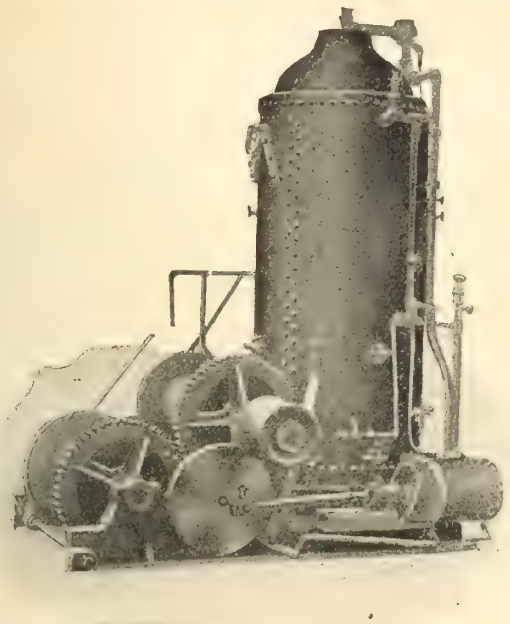
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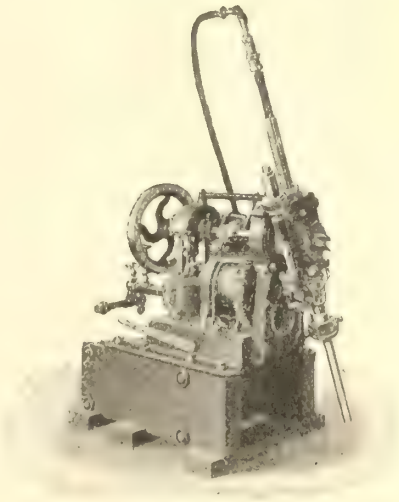
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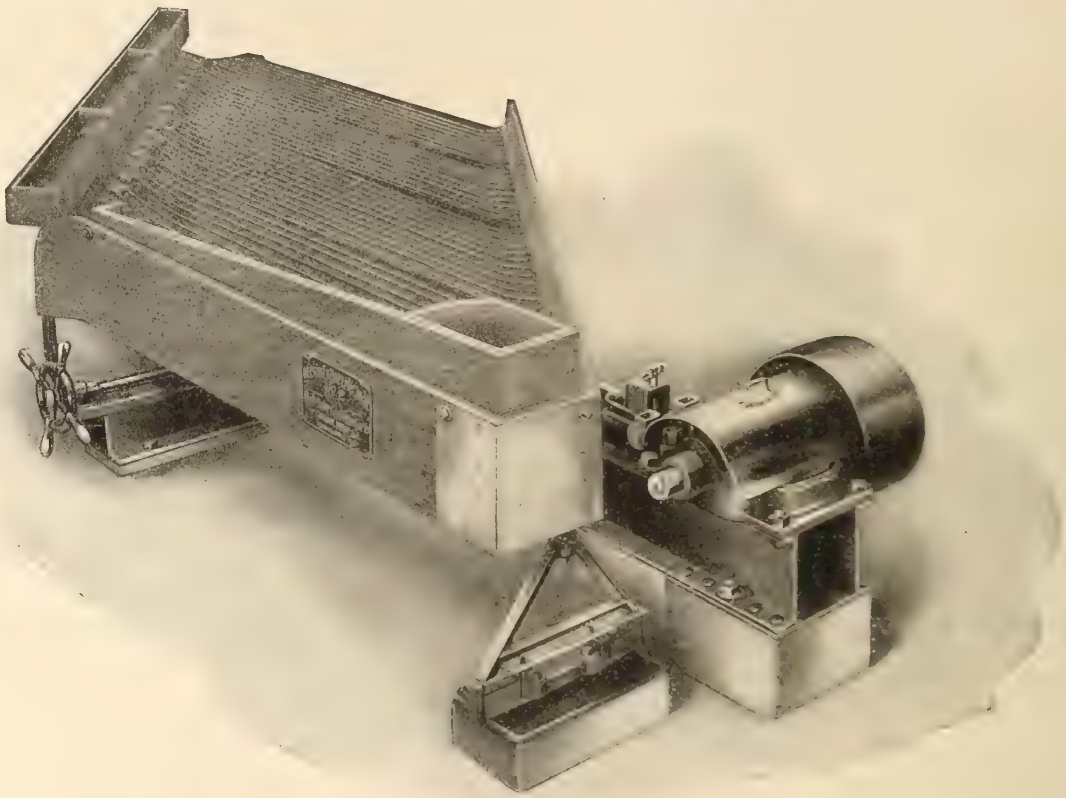
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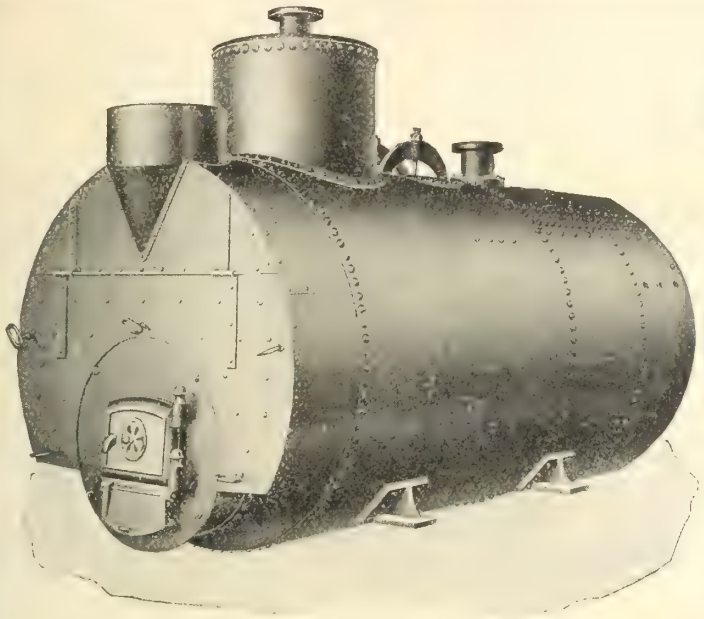


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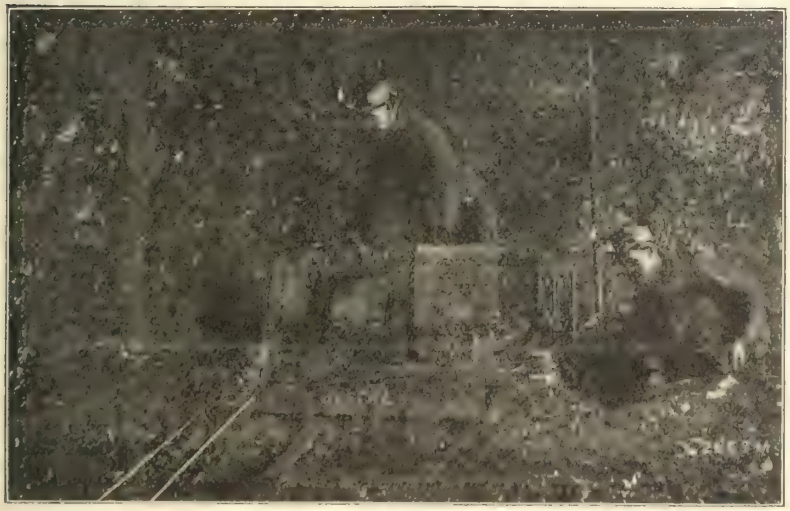
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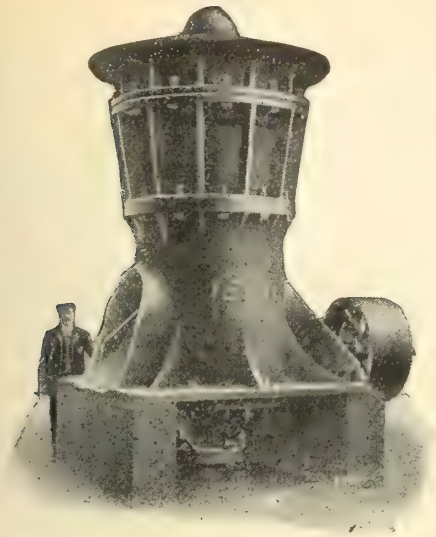
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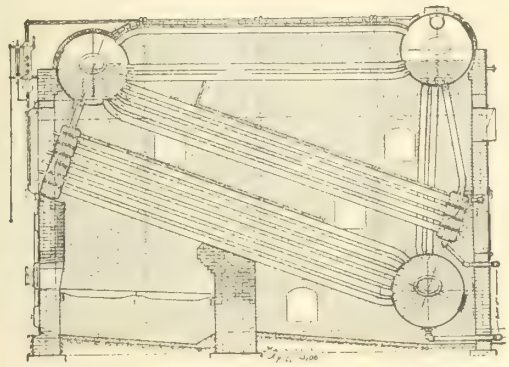
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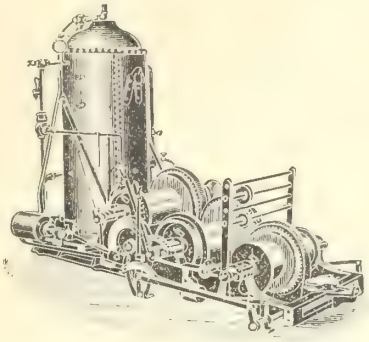
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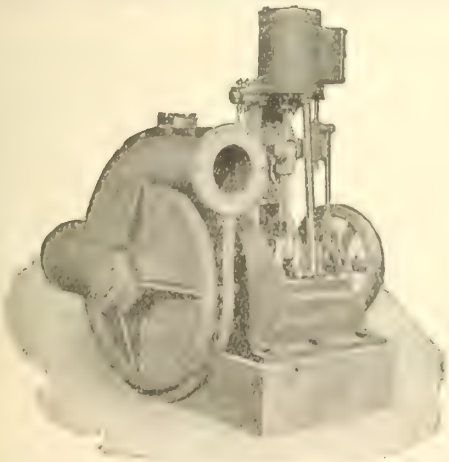
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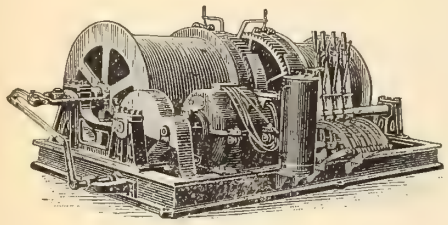
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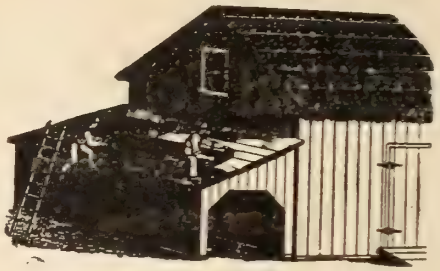
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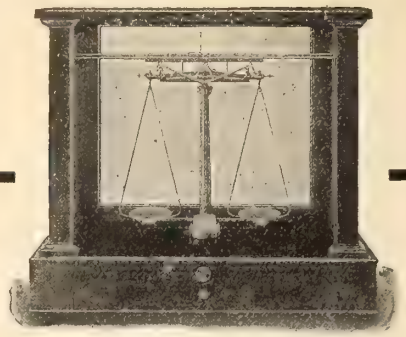
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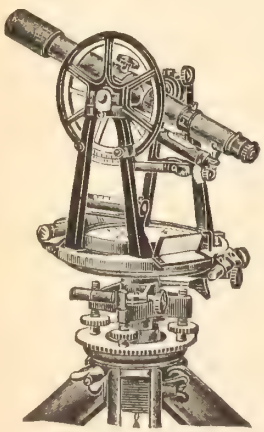
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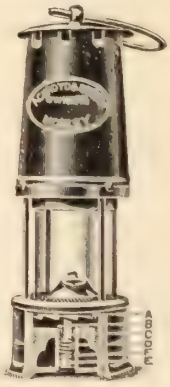
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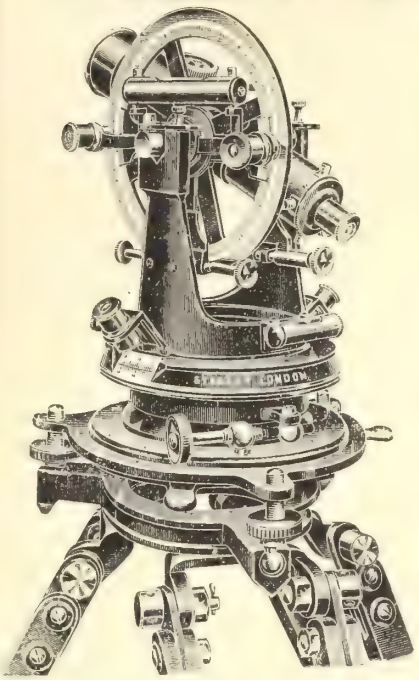
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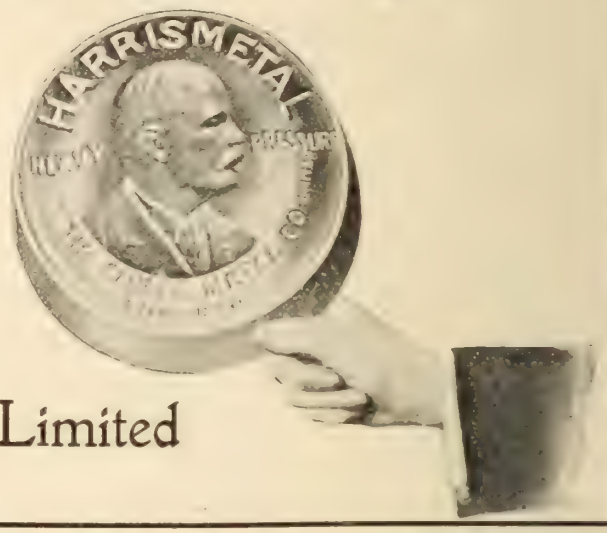
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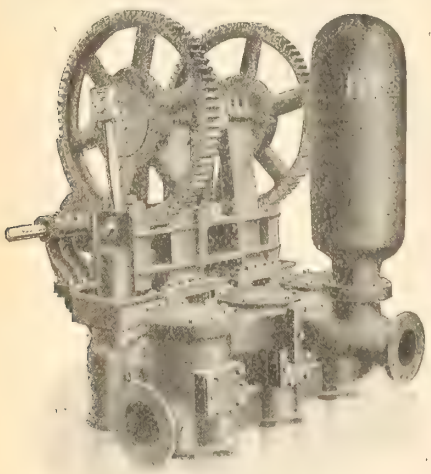
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO and MONTREAL, August 1, 1908 No. 15

The Canadian Mining Journal

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

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HIGH GRADING.

In the early days of the Yukon gold excitement gold stealing was known to be prevalent and was winked at. The rich creeks of Eldorado, Bonanza, and Gold Run were particularly notorious as fields of operation for gold thieves. We have been credibly informed that in four years not less than eight or ten million dollars worth of gold was taken from these spectacular workings by persons other than the owners.

The gold mines of Nova Scotia have yielded more gold than shown by official returns. Many of the gold veins of the province are noted for the beauty of the specimen gold that they contain. In the palmy sixties hundreds of ounces found their way out of the mine by unauthorized channels.

The purloining of amalgam from the battery plates of stamp-mills is another prevalent variety of misappropriation.

As indicated before in the "Canadian Mining Journal," silver stealing has assumed serious proportions in Cobalt. Assertions to the effect that high grading is carried on to the extent of more than thirty thousand ounces per month, were received at first with incredulity. But, while it is impossible to estimate precisely the toll exacted by the silver thief, there is strong evidence, both direct and indirect, that the case has not been exaggerated.

Apparently the playful habit of enriching oneself at the expense of a mere mine owner is looked upon as an excusable failing. It is time for this point of view to be corrected.

Gold stealing and silver stealing are unqualified theft, and justice demands that the thieves be punished promptly and efficaciously.

Unfortunately our statute books do not provide effective means for bringing high graders to justice. Strong representations, however, have been made to the Minister of Justice at Ottawa and it is believed that the necessary Federal enactments will be promulgated before the close of this session. If the matter is laid over until next session it will be the duty of all the mining provinces to make a combined effort towards clearing up the situation.

A NOTEWORTHY DISCOVERY.

The world's production of tungsten ores amounts to only four thousand tons, and this in spite of a growing demand. From Queensland and the United States comes the principal supply. The prices paid are not constant, owing largely to the fact that much of the ore is mined in isolated districts where the miner has

little chance to avail himself of the best market prices. But usually the price per unit ranges between $5 and $10 per unit for ore carrying sixty per cent. of tungsten tri-oxide. Hence, the mining of tungsten ores is nearly always profitable.

There have been discoveries made of wolframite and scheelite in Nova Scotia, British Columbia, and Ontario, but heretofore the ores have not been found in commercial qualities.

Within the past few weeks, however, a vein of scheelite, four inches wide, has been opened near the gold mine of the Consolidated Mines Company of Canada, at Moose River, Halifax County, N. S.

The vein, which has been traced for five hundred feet, lies in a slate belt. Foot-wall and hanging wall are well defined. The vein is four inches wide and is composed of scheelite, accompanied, unfortunately, by a considerable quantity of mispickel. However, the ore, as mined and without concentration, shows 50 per cent. scheelite, and the separation of this mineral from the mispickel should be a matter of no difficulty.

In a forthcoming issue we shall publish a full account of this new find. Meanwhile we wish to emphasize again the fact that, even in a country as small as Nova Scotia, where mining has been an important activity for many years, there are unsuspected mineral possibilities. It is too true that nearly all the important mineral discoveries in the history of mining in Canada have been accidental. We have now sufficient knowledge of the geology and topography of our country to encourage systematic investigation. The chances taken by the uninstructed prospector can be largely eliminated by intelligent study, practical knowledge, and carefully constructed plans of campaign.

TECHNICAL WRITING.

On another page apears a review of Mr. T. A. Rickard's new book "A Guide to Technical Writing."

We regard the publication of this modest volume as an event both pleasant and significant.

For long Mr. Rickard has thrown the whole weight of his influence in the direction of reform. Once a flagrant sinner himself, according to his own frank confession, he has, with prayer and fasting, chastened and purified his style and diction. One result is that his writings are undoubtedly more widely read and more keenly enjoyed than those of any other writer on mining topics.

It is not possible, of course, to ascribe this pre-eminence entirely to carefully cultivated accuracy in the use of language. Perfection, whether on the printed page or in speech, is a pale thing. But Mr. Rickard's writings are neither perfect nor pale. They are spontaneous, vigorous, eminently readable, and accurate—humanly, not divinely, accurate. They have an inherent charm that can neither be acquired nor transmitted; but they also show the signs of careful workmanship.

Now the path of the reformer is a rocky one. He is usually mistaken for a prig or for a fool, and sometimes he is both.

But the author of this bold and diminutive volume is neither a fool nor a prig. He is a mining engineer. He has wrought in mining fields all over the world. His wide knowledge of mining men and affairs has been honestly gained and earnestly absorbed. He writes as a mining engineer to brothers of his own profession. And he is worth listening to.

If, then, an experienced and cultivated writer feels deeply the need of purifying current technical literary usages, of cutting out what is spurious and superfluous, of cleaving to that which is simple, of choosing that which is correct, it is surely not too much to expect of younger and inexperienced writers that they will seek to avoid the open pit-falls of error and bad taste.

In all seriousness, loose, sloppy writing is inexcusable. Mining men are, for reasons into which we need not enter, painfully prone to carelessness in this direction. A little care, a little thought, the exercise of a little sound common sense would show offenders the justice of Mr. Rickard's strictures and the importance of his mission.

We earnestly hope that "A Guide to Technical Writing" will find its way into every Canadian mining camp and into every Canadian mining engineer's office.

THE GYPSUM INDUSTRY OF NOVA SCOTIA.

The gypsum deposits of Nova Scotia are one of that province's large assets. During the year 1907 the quantity of gypsum quarried was 332,345 gross tons. With the exception of a few thousand tons calcined and manufactured into plaster in the province, the whole of this output was exported to the United States.

The value of crude gypsum to the Nova Scotian operators is about one dollar per ton. It is shipped to the various points in the United States where a duty of 50 cents per ton is imposed. The manufactured product is sent back to Canada where it pays a duty of 12½ cents per ton.

Were all the gypsum produced in Nova Scotia calcined and manufactured before exportation the province would gain considerably more than one million dollars per annum.

This statement is strengthened by the fact that Nova Scotia and New Brunswick supply all but a fraction of the gypsum imported by the United States.

The analogy between the gypsum of Nova Scotia and the copper and nickel of Ontario is complete. Both provinces are losing millions annually by exporting raw material instead of finished products.

The Halifax Chronicle makes a strong plea for the assistance of the Federal Department of Mines in giving adequate publicity to the extent and importance of the maritime gypsum deposits. We take it that this is a reasonable and seasonable request. The first duty of the Department of Mines is to give its services to those branches of the mineral industry that most need it and that, in the opinion of those competent to judge, will give a suitable return for effort expended.

Examination of statistics leaves no room for doubt as to the assured future of the maritime gypsum industry. The enormous known deposits in Nova Scotia and New Brunswick, and the exceptional facilities for mining transportation, and marketing, provide ample foundations for large expansion.

INDUSTRIAL.

We commend to the attention of our readers the matter published in the "Industrial Section" of the "Canadian Mining Journal." From our advertisers and other manufacturing concerns, we receive from time to time illustrated descriptions of new and improved types of machinery. Whilst all of this material is frankly submitted for direct and indirect advertising purposes, there is often highly valuable technical information included.

All such special articles, when of sufficient interest to merit publication, will be grouped in our "Industrial Section." The sources drawn upon are not confined to those firms whose names appear on our advertising pages. Whilst, naturally, these contribute matter most regularly, yet notices and special descriptions reach us from many other manufacturing concerns. These we use as opportunity offers.

The central idea of such a department in the Journal is the segregation of anything that smacks of advertising. The pages used are never, under any consideration, sold as advertising space. But the open distinction signified by the title "Industrial Section" marks them as being in a class by themselves and gives us the opportunity of using excellent material without the danger of lowering the general tone of the Journal.

PRINCE EDWARD ISLAND.

The smallest province of the Dominion does not appear in the list of mineral producing countries. It is rich agriculturally, and its shore fisheries are not inconsiderable. But there are no mining activities throughout the length and breadth of the fertile island.

But now, after due weighing of geologic evidence, the Dominion Government has decided that Prince Edward Island is a fair field for prospecting. Therefore the strata that underlie the tight little province are to be explored in the hope of finding coal.

The Island's situation geographically might justify the use of the word "expectation" instead of "hope."

EDITORIAL NOTE.

The Russian Government is contemplating a new State monopoly in platinum. Russia produces about seven tons of the metal annually. Most of this amount is exported to the United States and Germany. The effect of a considerable increase in price would have a serious effect upon the electrical industries. The search for platinum in Canada should be encouraged.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

Article II.—The Mines of the Glace Bay Basin. (continued)

Reserve Colliery (No. 5 Colliery, Phalen Seam).—Reserve Colliery obtained its distinctive name from the fact that it was originally opened to work a concession reserved by the Provincial Government for the purpose of encouraging the building of a railway from Sydney to tap the mines of the Glace Bay Basin. This work was undertaken by the Glasgow & Cape Breton Coal & Railway Company, who were afterwards reorganized as the Sydney & Louisburg Coal & Railway Company, under which company Reserve mine was worked until it was absorbed into the Dominion Coal Company's properties.

The first shipments from Reserve are recorded in 1872, when the mine produced 27,802 tons, followed by a production of 63,300 in 1873. During 1874 to 1877 the conditions of the coal trade were so bad that operations were practically suspended. From 1878 to the present time, however, Reserve mine has been a consistent and steady producer. Since the opening of the mine in 1872 about 9,500,000 tons have been produced, of which amount 8,000,000, or 84 per cent. of the aggregate, has been mined under the direction of the Dominion Coal Company since 1893.

The coalfield has ben worked through three main haulages, namely, the French Slope, Main Slope and East Slope, all of which proceed from the outcrop of the Phalen Seam. The Main Slope was closed at the end of 1894, its territory being exhausted. The East Slope rope will shortly be taken off, when the haulage will be limited to the French Slope. This slope is 12,-

Reserve territory, which is the barrier against the work-000 feet in length from the bankhead to the end of ings of No. 2 Colliery. An auxiliary electrical haulage plant has recently been installed at No. 8 Landing, at a point 9,000 feet below the bankhead. This trip haulage will deal with all the coal below that point, and will transfer to the endless main haulage by means of a curve. The power for the trip haulage is generated at



Dominion, No. 3.

the Central Electric Plant, and is conveyed down a borehole 420 feet deep to a 100 h.p. Westinghouse motor.

The old main haulage engine was a large engine originally intended to drive the shafting of a large cotton mill, and it operated three haulages by means of friction clutches on a common shafting. It has recently been dismantled and replaced by one of the 28 inches by 60 inches engines from No. 1 Colliery.

The surface power equipment consists of seven Babcock & Wilcox boilers with rated capacity of 1,678 h.p., fitted with Parsons blowers. There are three steel and one brick smokestacks.

The air compressor house contains two Rand Compressors, steam cylinders 36 inches by 20 inches by 48 inches stroke, with a capacity of 3,000 cubic feet per minute, installed in 1900; one straight line Norwalk compressor with a capacity of 2,000 cubic feet, installed in 1905. In 1906 a Walker compressor was added, having a capacity of 3,500 cubic feet. This compressor is of similar design to the four other Walker compressors that the Coal Company have installed. It is compound, steam cylinders 24 inches by 41 inches, air cylinders 23½ inches by 38 inches, with 48 inch stroke, running at 60 revolutions. The whole of the compressor plant is lubricated by an automatic lubricating installation, similar to the arrangement at the other collieries. The operation of the automatic lubrication is economical in the consumption of oil, and is much more cleanly and less dangerous to the enginemen than the previous oil-can method.

The mine is ventilated by two fans, one situated near the bankhead at Reserve, and the other at the mouth of the East Slope, about one mile distant. This latter fan is of the Guibal type, 24 feet diameter, vanes 6 feet 6 inches wide, running at 100 revolutions, with an original rated capacity of 300,000 cubic feet at 2 inch WG. There are two small boilers at the East Slope which generate steam for the fan engine. The ventilator at Reserve itself is a Chandler fan, 15 feet diameter, with a rated capacity of 205,000 cubic feet at 1.4 inches WG.

The bankhead is new, and was erected in place of the old structure that was destroyed by fire in October, 1906. This old bankhead had grown by successive accretions, and was a wonderful maze of screens and machinery, as such erections usually are. The present structure is of wood, hard pine posts with spruce stringers on concrete foundations, completely housed from the weather, and fitted throughout with stand pipes and hose for fire protection.

The screening plant consists of four sets of screens and picking belts, arranged to deal with the product from the Phalen and the Emery seams. At the present time Nos. 1 and 2 belts deal with the French Slope Phalen coal, No. 3 belt with the East Slope Phalen coal, and No. 4 with the Emery coal. When the East Slope is discontinued Nos. 3 and 4 belts will deal with the Emery output, which is steadily increasing.

The coal from the French Slope, after leaving the haulage rope, is conveyed by an inclined automatic car-haul to a Phillips automatic dump, which unloads on to a feeder belt 7 feet 6 inches long by 4 feet wide speeded at nine feet per minute. This belt discharges the coal gradually, with the minimum of breakage, and well distributed on to a battery of three shaking screens, which in turn discharge on to a picking belt, 38 feet 6 inches long by 5 feet wide, running at sixty feet per minute. The picking belts are well manned by young men, whose business it is to throw out any shale or foreign matter that is detrimental to the quality of coal, which is an easy matter owing to the even distribution of the coal layer and the slow movement of the picking belt. The other three belts are of similar construction, being 40 feet, 52 feet 6 inches, and 54 feet in length respectively. Each set of picking belts discharges on to a transverse loading belt, 39 feet long by 4 feet wide, driven by a 15 h.p. electric motor. The end of the loading belt can be raised or lowered according to the amount of coal in the car being loaded so as to limit the fall to a minimum and reduce the breakage. The screens and picking belts are driven by a 75 h.p. motor, and there is a separate motor for the car haul. Power is obtained from the Central Electric Plant.

The mouths of both the main and back deeps of the French Slope are protected by reinforced concrete ap-



Concrete Approach to the French Slope Reserve.

proaches, installed after the bankhead fire. That in the main deep is 90 feet in length and the back deep 30 feet.

The colliery shops are very complete, in order to render the colliery more or less independent of the central shops at Glace Bay. The machine shop contains a crank-shaper, 12-foot lathe, Merrill pipe threader and other machine tools, driven by a small Sturte-

vant vertical engine. There is also a carpenter and blacksmith's shop with a steam hammer for machine pick sharpening.

There are two lamphouses, one at Reserve, which serves both the Phalen and the Emery seams, and one for the East Slope side of the mine. They are fully equipped with automatic lamp filling and cleaining machinery, and with the Ackroyd & Best safety lamp, which was referred to in a previous notice. There are altogether about 1,200 lamps at this colliery, some 400 of which are in use in the Emery seam.

The mine has the usual complement of mining machines and shearers, and is equipped throughout, both above and below ground with fire hose, chemical extinguishers and water connections on the air lines.

The number of men on the payroll is around 600. At present the mine is double-shifted, and will probably remain so. Reserve Colliery was always a big producer, and on double shift has produced 800,000 tons in one year. The present policy of the Dominion Coal Company is in favor of single shift, as in many collieries the extra tonnage obtained is not always commensurate with the additional labor cost that double shift necessitates. Although it may be taken as a rule in all collieries that increased tonnage mean decreased



Dominion No. 3—Bankhead Approach.

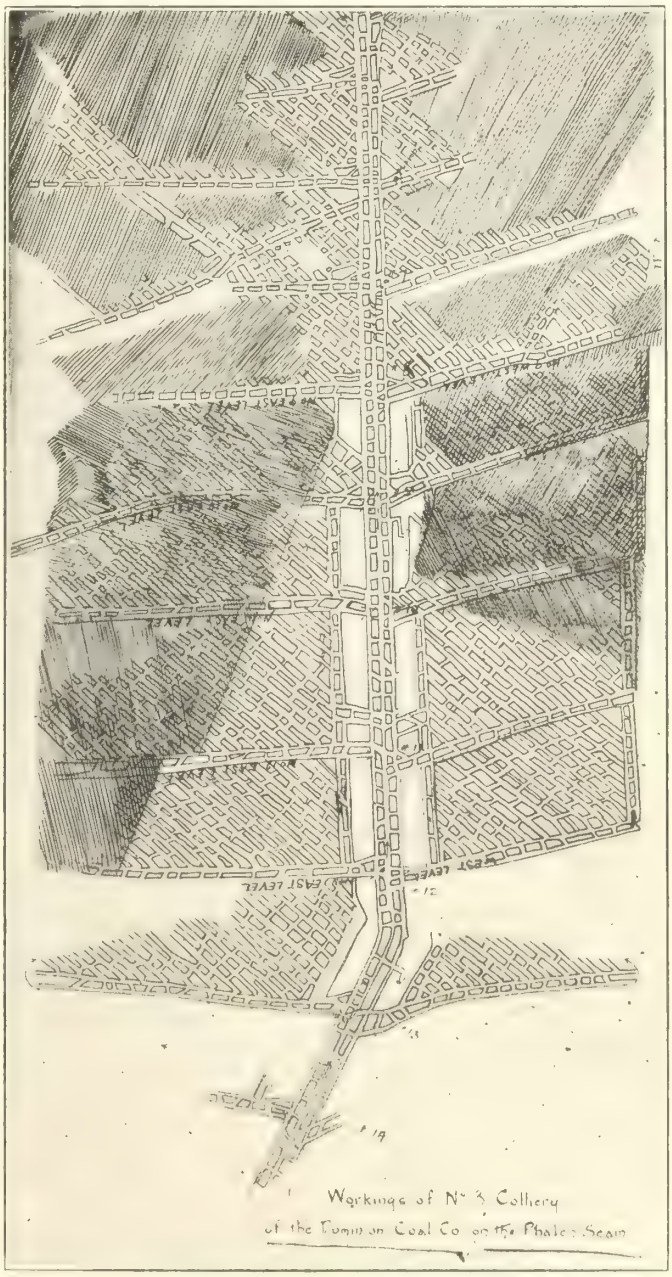
working expenses, yet there are circumstances when large outputs mean anything but economical mining.

Since the bankhead fire the Coal Company have spent a great deal of money around Reserve, and with its well designed bankhead, its new ring fence and the generally neat and trim way in which the surface is kept, the old colliery bears quite a rejuvenated aspect. Outside the fence is the colliery office and store, and near to the office is the fireman's hall, which will shortly be equipped with several Draeger apparatus as an auxiliary to the central rescue station.

Reference will be made more fully to the workings of the Emery seam at this colliery, in a subsequent notice.

No. 3 Colliery.—No. 3 mine is a slope mine occupying that portion of the Phalen coalfield lying between the territory of Caledonia Colliery on the eastern side and Reserve Colliery on the western side. The mine was opened in 1889, and commenced to produce coal in 1900, since which time it has put out 2,750,000 tons of coal, in round figures. The capacity of the mine at the present time is about 36,000 tons per month, on double shift.

The workings of No. 3 Colliery are typical of those of the other mines on the Phalen seam, and the plan accompanying this description will serve to give a fair idea of the methods of working which have been generally adopted in the Phalen seam. The pillar and stall method, or "stoop and room" is used exclusively, with the exception of a small section of No. 6 Colliery. Rooms are driven 20 feet wide, and the size of the pillars left will average 25 feet by 60 feet in No. 3 Colliery. As the workings go to the deep the pillars have of course to be left sufficiently large to withstand the greater strata pressure. This is a matter to which in late years the Dominion Coal Company have devoted particular attention. The inadequate pillars left in



past years have caused the loss of much coal, but the good methods pursued by the Coal Company in this matter are well exemplified at No. 3, where the pillars are being drawn systematically in retreating order outbye from the barrier, and no coal is being lost in the second working whatever.

The territory of No. 3 consists of an oblong piece of clear coalfield, without any disturbance. The main haulage road is laid out on full dip, the pitch being about 7 per cent. The levels are spaced every 450 feet,

and substantial pillars, 100 feet by 450 feet have been left, affording adequate protection to the main roadways. The compactness of the mine, its freedom from water, and the workmanlike layout of the underground workings, have combined to make No. 3 an economical and consistent producer, and it is one of the few mines that do really well when double shifted. It is generally referred to in genuine Canadian idiom, as a "pretty nice little proposition."

The chief difficulty at No. 3 has been its long haul. At one time the endless haulage was 11,500 feet in length, which meant the handling of 23,000 feet in 1⅛ inch wire rope. The haulage is now divided into two sections. The upper haul is 8,000 feet in length, and is effected by means of a 22 inches by 42 inches hoist situated near the bankhead. There is an overground haul of about 4,500 feet from the mouth of the slopes to the bankhead, occasioned by the fact that No. 3 bankhead was originally designed to deal with the output from the Phalen and the Emery. The Emery slope, which is quite close to the bankhead was ultimately abandoned. The lower haul is effected by means of an electrically driven auxiliary haulage situated at No. 7 landing, supplied by power from the central power station, the transmission cables being carried down a borehole to a 200 h.p. Westinghouse motor. The present length of the lower haul is about 4,000 feet. The rope used is 1⅛-inch crucible steel in both cases. The mine cars have a capacity of two tons, and the track is 30-pound rails on wooden sleepers.

The surface plant consists of three Babcock & Wilcox boilers rated at 54 h.p. There is one large Walker compressor, compound type, steam cylinders 31-inches by 57 inches, air 32 inches by 51 inches, stroke 60 inches, running at 55 revolutions, with a capacity of 6,000 cubic feet per minute. The air pressure on leaving the compressor is about 75 pounds, and is delivered at the face at about 65 pounds. Some idea of the amount of air pipe that is needed in a machine pick mine may be gathered from the fact that No. 3 mine, which is a small one, has 12,000 feet of 8-inch pipe, 7,000 feet of 4-inch, and 30,000 feet of 1½ and 2-inch pipe.

The mine is ventilated by a 13 foot 6-inch Capell fan, having a capacity of 200,000 cubic feet at 2-inch wg., directly conected to an 18-inch by 18-inch Taylor-Chandler engine. The fan is substantially erected with steel and concrete housing. It is situated at the mouth of the slope, and has a separate small steam plant. The air current is carried direct from the fan a distance of 7,200 feet to the bottom of the deeps, air crossings being built over every landing, and is split at the face of the deep, returning up the main haulage road. The main intake is used also as the travelling road.

The mine water is very small in quantity, and is dealt with by two air-driven Cameron pumps 12 inches by 18 inches, which discharge through the Caledonia barrier at No. 7 level. The water is pumped at the Caledonia water shaft.

The bankhead is a wooden structure, approached by an inclined trestle, the return wheel of the endless haulage being situated at the rear end of the bankhead. The coal is dumped by two rotary Jenckes tipples, on to a feeding belt, over a triple shaking screen battery thence by means of a thirty feet picking belt to the cars. The bankhead has three tracks, for slack, nuts, and screened coal. The screening plant is driven by steam, and the colliery has its own independent electric lighting plant.

The colliery buildings are the usual ones, wash house, lamphouse holding 600 A. & B. safety lamps, warehouse, etc. There is a fireman's hall with hose reels and fire fighting apparatus, which will shortly receive several Draeger aparatus.

No. 3 Colliery is situated in a well wooded bit of countryside, and it is one of the pleasantest of the colliery villages. The miners' houses are built in well spaced blocks of two. Each house contains five rooms,



Type of Miners' Houses at No. [illegible] Colliery

and pantry, and they rent at $6 per month. The management has succeeded in making their workmen "houseproud," and with its whitewashed fences, freedom from unsightly garbage and its surrounding greenery, No. 3 approaches what a colliery village should be from an aesthetic and sanitary standpoint. The management and the citizens of No. 3 are to be congratulated on their public spirited initiative and their regard for those little decencies which make life in a colliery district worth living, and the lack of which is apt to lead to the reign of "shackdom" and dirt.

(To be continued.)

On recently fusing a little tantalum powder, Siemens and Halske placed it in a kind of Crooks' tube instead of an electric furnace. On the anode the metal powder received the bombardment of particles from the cathode, and was quickly fused. A magnet deflected the tiny stream of bundles, and made it act upon any desired part first of the mass of metal exposed at the anode.

To determine when wire hoisting ropes have depreciated beyond the limits of safety has been a difficulty of mining engineers, and to avoid risk—in the absence of exact tests—many ropes have been doubtless discarded while still in fairly good condition. The strength of the ropes is now gauged by a novel use of electric induction. The ropes are passed through a coil of copper wire traversed by an alternating electric current, and the variations of induced current—which exactly correspond to changes in the thickness of the rope—are recorded on a suitable instrument. Dangerous wear or broken strands cause the indicator to give warning.

VALUATION OF MINING PROPERTIES.

By George H. Gillespie, M.E.

(*Continued from last issue.*)

The profitable lifetime of a mine is an important feature, in that the investment must be returned within the period of the lifetime.

Should a property be purchased at, say, $500,000, and $100,000 be spent on plant, equipment and development, and the resultant net earnings be 20 per cent. per annum, or $120,000, on the total investment of $600,000, this would mean 5 per cent. interest on the investment and 15 per cent. towards return of capital. At the end of seven years the capital invested in the venture would be returned plus interest. It could hardly be considered that the return of capital plus 5 per cent. is a fair return for the risk of the venture. Therefore a higher earning power, or a much more extended lifetime must be looked for to justify the purchase of a property at such a price. The extension of the profitable assumed lifetime would depend largely upon the natural location of the mining property under consideration, a seven years' continuous profitable lifetime for a mining proposition being rather the exception than the rule. Such a price could only be justified by the actual presence in the mine of assured ore at the time of examination to give a production for seven years as indicated, and the extended lifetime or increased earning power could be justified by the indicated probabilities of the mine ahead of development. It would be safe to assume a reasonable continuity of conditions beyond the point of development, based upon conditions found in the actual ore reserves which had been developed. Provison would have to be made for additional development and working costs caused by increased depth, and in many cases for capital charges for re-equipping surface plants to admit of working at increased depths or on a larger scale.

In the case of the valuation of a silver mine in which the valuation of the ore reserves has been done with reasonable accuracy, but on the market price of silver of a year ago, let us suppose a mine in which $5,000,000 worth of silver ore is blocked out on four sides.

Silver has decreased in value 20 per cent. and the purchase price is $4,000,000, based on values of silver at date of examination.

$5,000,000—Value ore reserves a year ago.
1,000,000—Depreciation.

4,000,000 - Gross value at present prices.
400,000—10 per cent. silver values, smelting charges.

3,600,000
480,000—Annual operating charges $160,000, and cost of mining, etc., for annual gross output of $1,500,000.

$3,120,000.

Therefore, allowing a reasonable working capital in proportion to purchase price, say $500,000, the total investment would be $4,500,000, and against this we would have to-day assured net assets of $3,120,000 approximately. Should these net assets be the result of development to the 300 foot level, and should all conditions be favorable, it would be reasonable to assume that the second 300 feet of depth to be opened up would give ore reserves approximating in value to the first 300 feet. Of course additional working capital and working costs may have to be charged up against the opening up and working of this new ground.

$4,000,000—First block 300 feet.
4,000,000—Second block 300 feet.

8,000,000
800,000—Smelting charges.

7,200,000
1,000,000—Five years' operating expenses.

6,200,000
1,000,000—Interest charges at 5 p.c., 5 years.

$5,200,000

That is, operating this mine for five years to give a gross output of $1,500,000 per annum, at the end of five years the capital invested would be returned plus 5 per cent., and the mine worked out to the 600 foot level, leaving the ground below the 600 foot level to earn the real return for the risk of the venture. This would pre-suppose a continuous average profitable lifetime down to the 900,, 1,200 or deeper levels over a long period of time.

The case above has been that of a small vein or veins of exceedingly high grade silver ore where the gross output is large for a small tonnage of ore.

The fluctuations of the market affect a mine of this nature more than would be the case with a large low grade body of silver ore. The small high grade ore body will usually have a much shorter lifetime. Should it be operated during periods of low priced metal, it has a shorter lifetime in which to look for recovery in prices. Large low grade mines, having a longer lifetime, have a much better chance of good average market prices of products.

The purchase of a property for development, when the development must be spread over a period of years, such period being a period of non-productive operation, must be affected by the fact that capital so expended plus purchase price is losing interest so long as the mine is non-productive. Such loss of interest must be added to the final amount of capital to be returned from the operation of the venture. This feature is of course not alone confined to mining, but is common to most investments in ventures that call for gradual bulding up. In mining it has a greater influence on the problem, when it is considered, as has been already stated, there is only a certain definite ore body from which these charges and commensurate returns on investment must be won.

General.

Mining property that has been properly valued presents one of the best possible fields for investment. My own fixed belief is that the part capital should play in mining is that of creating industrial conditions, and not the purchase of golden but doubtful probabilities.

There is always the chance that a mine will turn out better than the facts observable appear to warrant. This is always the hope of the purchaser, but I do not believe that it would be wise or fair to pay higher prices for this chance. The more nearly mine valuation can be brought to the ideal of engineering which is a science based on facts, the better.

There are, of course, many problems of mine development that call for large expenditures and that are often speculative at their inception. The undertaking of such operations is often legitimate engineering, but I do not think that it is wise to pay large purchase prices for the privilege of taking such risks.

FLUORSPAR.

Abstract of Advance Chapter, Mineral Resources of the United States for 1907, by Ernest F. Burchard.

Character and Occurrence.

Fluorspar or fluorite, chemically calcium fluoride (CaF_2), consists of calcium and fluorine in the proportions of 51.1 to 48.9. The mineral is crystalline, only slightly harder than calcite, and consequently crushes easily. It crystallizes in the isometric system, and is commonly found in cubes. In color it is often white and opaque, although it ranges from a clear, slightly bluish, glasslike substance, through various brilliant shades. It is usually pure, running 98 to 99 per cent. calcium fluoride. Material carrying less than 95 per cent. finds little sale.

Fluorspar has a wide distribution geographically, but in only five States, Arizona, Colorado, Illinois, Kentucky and Tennessee, have deposits been exploited. It is also secured as a by-product of lead and zinc mining in Albemarle County, Va.

Practically, wherever it has been mined, fluorspar occurs as a vein material, although under widely different conditions. In the Kentucky-Illinois district it is the chief mineral of value in many of the veins, lead and zinc being of secondary importance, while in the Castle Dome district of Arizona, jig concentrates of fluorspar are made incidental to concentrating.

Preparation and Uses.

The various uses of fluorspar depend on its chemical composition, fluxing properties, and phosphorescence when heated, and on its optical and gem-like properties. Its preparation involves separation from other minerals, the treatment comprising hand-sorting, crushing, and jigging. Part of the high grade ore is ground and shipped in barrels and sacks; the rest is sold in lump form. Its separation from zinc blende is difficult, but has been accomplished by means of flotation in dilute solution of aluminium sulphate. This basic flotation process is now in successful operation at Marion, Ky. Shallow pans, in which mechanical stirrers are operated are the essential of the equipment.

The principal classes of consumers, in order of importance are, smelters and metallurgists, makers of opalescent glas and enamelled wares, and chemical manufacturers. The highest grade, "American lump No. 1," which runs less than 1 per cent. silica, and is white or clear pale blue in color, is sold either ground or in lumps to the two last classes of consumers. The grinding of the pure, clear spar can be dispensed with for some purposes, as it readily decrepitates to a powder when heated. The second grade, "American No. 2," is used in the production of ferrosilicon and ferromanganese, and in basic, open hearth steel furnaces to give increased fluidity to the slag and to reduce the contents of phosphorus and sulphur. This grade includes colored spar and may run as high as 4 per cent. silica, though most of it is sold with a 3 per cent. guarantee. The lowest grade, "gravel spar," including all that contains more than 4 per cent. silica as well as spar mixed with calcite, is used in iron and brass foundries. Its use makes the metal more fluid and permits the use of greater quantities of lower grades and scrap by carrying phosphorous, sulphur, and other impurities into the slag.

Although flourspar possesses higher quantitative efficiency as a flux than limestone, especially in smelting refractory ores, it can only be used in limited quantities. In England and on the continent the use of fluorspar is more common than in America. Its minor metallurgical uses are in the extraction of aluminium from bauxite, in smelting gold ores, in refining copper, and in refining lead bullion. In the latter process it is first converted into hydrofluoric acid.

Fluorspar is also used for bonding emery wheels, for carbon electrodes to increase their lighting efficiency, and as a constituent of Portland cement.

Production and Prices.

In 1907 the total quantity of fluorspar marketed was 49,486 short tons, valued at $287,342, a gain of 8,690 short tons in quantity and in value, $43, 317 over the output for 1906. This indicates a firm condition in the fluorspar industry, since there was on hand at the close of 1906 a stock of 13,470 tons, which has evidently been absorbed without leaving quite so large a surplus on hand at the close of 1907. Gravel spar was valued at $4.47 per ton; lump spar at $7.51; and ground fluorspar at $10.31 per ton. Small quantities of lump spar were reported to have sold at $18 to $35 per ton.

Up to October, 1907, the demand was generally strong, with prices ranging from 75 cents to $1 in advance of those of 1906. Toward the end of the year there was a decided faling off in production as a result of the depression in the iron and steel business.

Wholesale prices in December, 1907, in domestic lump spar f.o.b. shipping point, ranged from $8 to $10 per long ton; on ground spar, from $11.50 to $13.50 per long ton; and on foreign crude, ex dock, from $8 to $10 per long ton. In May, 1908, the quotations were exactly the same.

The fluorspar imported into the United States is said to come largely from English mines, the competition being felt principally along the Atlantic coast.

A new plan for storing gasolene or petrol depends upon the fire-stopping property of wire gauze that gives safety to the Davy mining lamp. A gauze tube is inserted in the opening of the can or tank, extending to the bottom, and the orifice is then sealed up by a plug held in place by fusible solder. If fire occurs near or around the tank, the solder melts and the plug is blown out, when the vapor escaping through the gauze tube burns quietly without explosion. In a test of the method, twelve out of seventeen ordinary cans filled with volatile oil exploded on contact with fire, throwing the burning liquid in every direction, but twelve cans fitted with the safety device failed to explode and the liquid burned quietly and harmlessly.

A Contribution to the Discussion on the Genesis of the Graphite in Argenteuil and Labelle Counties, in the Province of Quebec.

By F. Hille, M. E.

I arrived almost post festum at the meeting of the Canadian Mining Institute that was held last March in Ottawa, having been delayed by the lateness of the trains; the result of this was that I missed the reading of Mr. H. P. H. Brumel's paper on "The Modes of Occurrence of Canadian Graphite."

I now have before me the printed report of his contribution and of the discussion which followed it, as given in the Quarterly Bulletin of the Institute, and find them extremely interesting, not only from an industrial standpoint, but also from the view of economic geology.

The broad discusion of the subject especially impressed me as demonstrating that the members of the Institute are taking a keener interest in these matters, by offering, every man his quota, towards the solution of the phenomena of the origin of ore deposits.

In my own opinion there is no study more fascinating than the quest for a solution of the problems as to how or by what processes the different minerals are deposited in the various rocks in which they are found. And when we look over the field, and are confronted by the observation that in almost every locality we find some degree of dissimilarity or certain distinct features in the occurrence of even one and the same mineral, it is but natural that we should encounter problems, that multiply in proportion as our investigation extends from country to country.

Notwithstanding this, nature has given us certain basic rules upon which we can build the foundation towards a solution of her riddles.

While I was reading Mr. Brumel's paper and the opinions that were expressed by the different members regarding the genesis of graphite, it occurred to me that it might be of interest to offer a hypothesis, which, in my opinion, appears to correspond more strictly to the field evidence than some of those which were brought forward during the discussion.

I wish to take this opportunity of reviewing these hypotheses again, in order to bring them afresh into my readers' minds, and in order to call more particular attention to those points which, to my mind, seem to weaken their probabliity of affording a correct solution.

Four theories were brought out in the paper and in the later discussion.

1. That propounded by Mr. Brumel, the leaching of the "original rocks" thus freeing them of carbon, which was subsequently redeposited as graphite.

2. That of Mr. Coste,—the deposition of the graphite by volcanic emanations, in the form of hydro-carbons.

3. That of Mr. Cirkel—idiogenetic occurrence with the enclosing rocks.

4. That of Dr. Woodman,—which hints at an organic origin.

Let us consider the first hypothesis. Mr. Brumel presupposes that some "original rocks" had contained carbon, and the silicious and other waters had leached out the carbon and redeposited it into the gneiss and along the contact and fissures of the eruptives. He does not state what he implies by the "original rocks." If he means by this term the oldest rocks, then we must regard it as referring to the gneiss as such, he himself calling this an archaean rock. Next in point of age we must consider the limestone, then the diorite, granite, felsite and lastly the diabase. Are these latter Mr. Brumel's "original rocks?"

If we were to make use of microscopic examination, I doubt much whether we would discover in the eruptive rocks last named, with the probable exception of the diabase, even the slightest traces of graphite; had these been the vehicles that carried the carbon we would still expect to find a certain amount of carbon yet in the rocks, it being inconceivable that the solutions should have leached every particle out of the rock.

Mr. Brumel makes the further statement that the contact of these eruptives with the limestone showed only silicate of lime, and with the gneisses, sulphate of lime; this would signify that the granite emanations carried principally silicates, while the diorite carried more sulphates. If, however, these intrusives had contained carbon, their point of contact with other rocks, (the veins excepted, which were produced by a later incident), should undoubtedly show carbon also, in some form or other. I am exceedingly curious to learn in what form the carbon existed in these original rocks, in order to allow it to submit so readily to the leaching process by silicious and other—perhaps sulphurous—waters. It is not to be expected that hydrocarbons would be found deposited in an eruptive rock, at least not until it is cooled, and we are almost compelled to believe that, on account of the intrusion of the four later eruptives, the rocks must have retained an intense heat for a very long time. More than this, a combination of carbon and sulphur could hardly be obtained in the manner suggested, and even granting that this were possible, the resulting combination, CS_2, or CS, would be so unstable a compound that in its course of travel through the fissures and cracks of other rocks, it would seek an exit by the best and shortest outlet to the surface—and then where would the graphite come in?

This hypothesis seems to me to be extremely unconvincing, until some further light is shed upon several of the points.

2. The second theory attributes the production of graphite to a process of injection of hydro-carbons into the openings of rocks other than that from which it came. There is, perhaps, a possibility that something of this nature may have taken place, but in order to ensure the complete success of the process suggested in this hypothesis, we must presuppose the active presence of three important factors, viz., (a), the meeting and combination of emanating carbon with similarly hydrogen, in a somewhat cooler portion of the vent through which they were seeking an outlet to the surface. (b), The condensation of these hydro-carbon vapors and their deposition into the yet cooler fissures, of various sizes, of the different rocks, and, (c), ultimately the conversion of this mineral into graphite, by considerable heat, produced, either by the last of the erup-

tive rocks, or by intense pressure, without the admission of air or oxygen, in fact, I might say, almost in a vacuum. That hydro-carbons are produced by such a process as I have described is certain, but it is, without doubt, a very delicate one, to produce graphite from them by eliminating the hydrogen from the carbon without evaporating both elements. In addition to this, the statements that were made above, regarding the continuous heat produced by the rapid succession of divers eruptives, still holds good here, and this goes to show that hydro-carbons could not have long remained in a state of condensation in these rocks, as this condensation could only have occurred at a time when the diorite, granite, and felsite had cooled sufficiently to permit it.

3. The third hypothesis supposes that the graphite might have been deposited at the same time as the constituents of the gneiss, and that this rock is a sandstone, not an eruptive, and that the graphite could not have been taken up by it in a disseminated condition. And the further opinion was advanced that the graphite had not been deposited as such, but as an "original mineral," and later converted into its present state.

In reply to this let me say: Mr. Brumel, at the beginning of his paper brought to our attention the fact that the graphite was found in the Archaean rocks; if this be the case, then we have to deal, not with a metamorphosed sandstone, but with a Laurentian gneiss of volcanic origin, and somewhat altered and shattered, in situ, by the later intruding or extruding rocks. Were this rock of sedimentary origin the microscope would soon inform us of its true nature. On account of the stresses which it underwent, it became pervious to the inflow of vapors and fumes, especially under pressure, just as a porous sandstone would, as may be shown by the different secondary minerals contained therein. Why a sandstone should not absorb these volcanic products I fail to see, for we must not lose sight of the fact that there are porous sandstones, crushed sandstones and also impervious sandstones.

Let us now consider why the claim that the graphite might be an idogenetic product with the sandstone cannot be supported by field evidence. First, take into consideration only the enormous time that must have elapsed from the beginning of the formation of a sandstone of such considerable extent to the time of its solidification, and again to the period of the eruption, first of the basic and later of the acid type of rocks, and lastly, to the time of the diabase eruption—a decidedly long period of time indeed! Now we have seen that there are graphite deposits of all descriptions, in and in contact with these younger eruptive rocks, graphite, very pure and of crystalline structure. Whence did this portion come? Was there a constant supply of this carbon furnished over this long period, sufficient, not only to satisfy an immense deposit of "sandstone," but also to fill the fissures in rocks of a much later age over a very considerable area? Another matter upon which I would desire to be enlightened is what are we to understand by an "original mineral of carbon" that is deposited together with the constituents of a sandstone, and changed later into graphite. If it is not a volcanic emanation product, then it must have had an organic origin. There is, however, no basis for our supposing the existence of organic life in archaean times, and we are thrust back to the conclusion that, after all, it must be a carbon originating from the only source from which we could expect that element to be derived, viz., a plutonic source. For these reasons I do not think that this whole hypothesis is tenable.

4. The remarks contributed by Dr. Woodman to the discussion on the paper are the only criticism which introduces the organic origin of carbon, especially as regards the second of the examples which he quotes. The first instances cited by him are not sufficiently elaborated and explained to give us a definite picture of the geological features of that district, nor is there any elucidation of how the black slates arrived there, or what is their nature and composition, whether clay-slates or the remains of former volcanic ash-beds. His second example has no possible connection with the subject of Mr. Brumel's paper, which is dealing solely with a graphite occurrence in veins and impregations in an Archaean rock stratum, in which there was not the remotest possibility of the formation of organic coal beds. The only service rendered is perhaps to show in how many different ways graphite might be formed.

I will now, with the reader's permission, explain my own views as to the manner in which these graphite deposits came into existence in the localities under consideration by Mr. Brumel.

Before taking up the origin of the graphite itself, it is necessary for us to take into consideration the manner in which the receptacles, that is the openings, fissures and cracks, in the different rocks were formed, and in what sequence.

We have already seen that the gneiss is the oldest of the series, and next probably comes the limestone, then following in regular order the diorite, granite and felsite, and last of all the diabase. Now it is obvious that the fissures in the gneiss and the limestone were produced by the eruptive rocks which followed later, the fissures in the diorite by the granite, felsite and, perhaps also, the diabase, while the contact fissures were the result of either the stresses accompanying the eruption of each successive rock, or of the contraction of these eruptives as well. A portion of these fissures in the gneiss and limestone was filled by the silicates of the granites and the sulphates of the diorites; there is, therefore, no evidence to show that either the diorite or the granite have contributed to the origin of the graphite. There is now only one crack left to which we have to look for the parentage of the mineral in question, and this is the diabase. There is every probability that here, as we find in so many other localities, the trap rock was the original source.

I have had opportunities of examining a large number of graphite deposits in the archaean and post-archaean rocks, and in every case I have been able to trace their origin to the diabase, and the principal basis of proof rested upon the fact that this rock itself carried in some cases considerable, and in other cases appreciable amounts of this mineral.

We find in this locality a number of deposits of graphite, although they are of no great extent and the mineral is somewhat impure; we find further a number of diabase dykes, being the plutonic facies of exposed laccolites, which are heavily saturated with graphite; we have several diabase craters and numerous dykes, nearly every one of which shows more or less graphite; in the immediate vicinity of some of these trap dykes we find a number of small nests of anthraxolite; we have also a large area covered with the co-called "black slates," which are merely solidi-

fied ash-beds, the exhalations or explosion products of our diabase volcanoes, and these contain, in places, a large percentage of graphite.

I also observed graphite deposits and incrustations along the trap rocks in the American Rockies, which I visited last year, and have met with a similar occurrence in different parts of Europe, but after all, these instances which have come under my personal observation, are insignificant as compared with the many similar occurrences of which we have knowledge that are scattered throughout the world.

Let us now consider how we can account for the origin of the graphite in the localities here under discussion. Mr. Brumel mentioned the fact that in several places the graphite is found in contact with the diabase, but very little importance was given to this rock in the course of his paper, the reason for this being, probably, owing to the outcrops being rather infrequent, and the graphite deposits in contact with it being of no great commercial importance. However, we ought not to overlook the fact that the diabase occurs not infrequently in the form of immense laccoliths, and that sometimes only a few small apophyses are found breaking through to the surface, or have been exposed by the erosion of the overlying strata. Let us accept this as having occurred in the locality in question, and suppose that the vapors and fumes of this laccolith, composed of carbon as well as other constituents, had been compressed into the fissures and fractures of the rocks above named, where they were retained in a condensed form as graphite. Just as from a volcano there are poured forth, with tremendous force, ashes including particles of graphite, in combination with steam and other gaseous elements as an explosive and triturating vehicle, so also could graphite, with gases as the carrying agents, be injected into the smallest interstices and crevices of the rocks. Again, if we grant that it is possible that a magma, injected into any rock strata, can carry graphite almost to saturation, then we must also admit the possibility not only that this carbon escaped from this magma, with other gases, but also that such gases found an outlet from some source at a far greater depth, and were deposited in a cooler stratum in the form in which we find them there to-day. The fissures which we now find on the surface might have been at the time that this deposit was injected, in a stratum hundreds, or even thousands of feet below the former surface of the earth, and they may be regarded as vents which had attained a certain degree of temperature favorable to the deposition and retention of the graphite.

The explanation that I have given above is perhaps the simplest possible of the genesis of the Quebec graphite, being based upon phenomena with which most of us are, or should be quite familiar, but we usually are only too apt to seek for our solutions of the processes of nature by piling hypothesis upon hypothesis, a method that only results in irritating us, and eventually carries us farther and farther away from the goal we seek.

The processes of nature's laboratory are, after all, simple enough, if we only endeavor to study them patiently and read them correctly, but this cannot be done in our studies, nor can the knowledge be acquired from books. No, indeed; rather should we go out and, as it were throw ourselves into nature's arms and allow her to show us the products of her laboratory, pick up every little stone and mineral, piecing them together like the pattern of a mosaic, and resolving them into one harmonious whole, and the result will always be a beautiful and perfect picture.

THE TECHNICAL ANALYSIS OF MAGNETITE, HEMATITE AND LIMONITE.

By R. Bolling.

In the Sydney district all of the above minerals are reduced to pig iron in the blast furnaces located at South Sydney and Sydney Mines. About 600,000 tons of ore are smelted annually. Systematic sampling and analysis are of course necessary from a metallurgical standpoint as well as for the computation of the bounty donated by the government to foster the steel industry in Canada.

Sampling.

There is no royal road to securing a representative sample of a cargo of iron ore. Some experience in this business is perhaps the best teacher, in fact, the I. C. S. schools at Scranton, Pa., who will teach and guarantee a position in any line from a "showcard writer" to that of mining engineer are silent on the subject of sampling. It cannot be taught, even by mail. It must come from personal observation and has to be learned on the spot. Fresenius tritely remarks in the preface to his "Quantitative Analysis," "the larger the sample, the more accurate the analysis," but adds "the smaller the sample, the sonner the analysis will be finished." It is well to steer a medium course in taking samples. My practice is to take 20 pounds from a railroad car and 200 to 500 pounds from steamers.

Crushing.

Jaw crushers working on the Blake principle are satisfactory on hard lump ore. They must be driven by power. All of the sample should be crushed to pass a half-inch sieve. The sample, if heavy, should be worked up in sections, in the quartering operation. The simplest method of mixing preparatory to quartering is to throw the mass of ore in the centre of a large rubber cloth blanket. This is then held by the corners by two men and a rolling and oscillating motion imparted to the sample. Results are very satisfactory as regards uniformity of the mass.

Drying.

Moisture must be accurately determined. The sample quartered down to from 5 to 50 pounds depending on the original sample, is weighed in flat copper receptacles, and dryed on a steam table to constant weight.

Grinding.

There is only one kind of machine that was ever intended for grinding iron ores, this is the ball mill. Its work is perfect. Large mills with drums 20 to 30 inches should be used. They must be "rinsed" out with the ore from a discarded quarter of the sample to be ground, before applying the power.

Agate Mortar Fine Grinding.

Sample from the ball mill is bottled and a small portion, 5 to 8 grams, ground in the fine mortar, until it feels free from grit.

Preliminary Tests.

Spread the ore powder on a glass plate and draw the poles of a horse shoe magnet over. If it attracts entirely it is magnetite, if partially, it should be treated as magnetite, if not at all it is either hematite or limonite. Heat a small portion in hard glass test tube, if limonite, moisture condeses on the cool walls. These tests will indicate the kind of ore, whether magnetite, hematite or limonite. They also decide the method of treatment. Magnetites are only partially soluble in hydrochloric acid, whereas hematite and limonite are completely soluble except in rare instances.

Getting the Ore in Solution.

This is an important step in its analysis. More low results come from neglect or inexperience at this point than from awkward manipulation. You can never feel easy in your mind if little black specks are seen after the ore is supposed to be dissolved. Begin right and the analysis will be finished much quicker. It is no use attempting accurate analysis if the agate has not been rubbed long and hard. It is not pleasant, but repays the grinder in mental satisfaction afterwards.

Magnetite.

Fuse 5 grams of ore and 15 grams of sodium carbonate (dry) in a large 60 c.c. platinum crucible with lid, for thirty minutes over an air-gas blowpipe. It is better to start the fusion with the air shut off for the first few minutes and then gradually increase the air blast to the maximum. Cool and place in a large 500 c.c. porcelain casserole and heat on the electric hot plate or other hot metal surface, adding 400 c.c. of HCl, 1.10 sp. gr., to dissolve the fused mass and covering with a clock glass. After a short time the crucible can be examined and if no fused material is cemented to its sides it can be removed and rinsed off with water. Having taken out the crucible and its lid, the casserole is allowed to stand on the plate until nearly all the acid is evaporated, then cautiously moved to a cooler part and there watched while it evaporates to dryness. Heating must be continued until every trace of HCl is driven off.

Limonite and Hematite.

Fusion can be dispensed with if .5 grams of ore are weighed into a 500 c.c. casserole and heated with 400 c.c. of HCl, 1.10, in the same manner as described for the magnetite sample. The sample can now be treated in the exactly the same manner, viz.: The residue dissolved with 50 c.c. HCl, 1.20 sp. gr., diluted with water and the silica separated by filtration. The filtrate is caught in a 500 c.c. volumetric flask and, after washing with dilute acid and hot water, the silica is removed from the filter, ignited in a platinum crucible and weighed, the weight divided by 5 and multiplied by 100 gives the percentage of silica. The contents of the volumetric flask are now brought up to the mark with cold water, a rubber stopper inserted and the contents thoroughly mixed. With pipettes measure into appropriate beakers, 100, 125 and 75 c.c. of the ore solution, and proceed thus: The 100 c.c. and 125 c.c. portions are evaporated down to near dryness and strong nitric acid added, then evaporated a second time and finally a third time. Phosphorus is determined in the 100 c.c. portion by the well known molybdate precipitation and titrated with nitric acid solution, after solution in standard caustic potash, of a strength of about .00014, or thereabouts of phosphorus. The alkalimetric method of estimating phosphorous is very simple and exact. Two solutions of acid and alkali are balanced against each other and then standardized against a standard steel or pig iron.

The beaker with the 125 c.c. portion is now diluted with water, transferred into a liter flask, zinc oxide emulsion added to precipitate the iron, mixed, and 500 c.c. filtered off through cotton, heated to boiling and titrated with decinormal $KMn\ O_4$ solution, 1 c.c. equivalent to .0016 gram of manganese. This is Volhard's method and for simplicity and accuracy it can be recommended.

The beaker with 125 c.c. portion is transferred to a one liter beaker, neutralized with ammonia, sodium acetate solution added and iron, alumina and phosphorous precipitated by boiling. Filter, and wash with hot water, and boil up with water and wash again to free precipitate from all soluble salts. To filtrate add bromine water and then ammonia, warm on hot plate a few hours and filter. To filtrate which must be boiling, add hot ammonia oxalate and filter off lime, titrate the precipitate with $K\ Mn\ O_4$ solution, each c.c. of the decinormal solution being equal to .0028 gram lime. The filtrate from the oxalate precipitation is evaporated to small bulk, 100 to 200 c.c. cooled, and magnesia precipitated by microcosmic salt, after addition of 25 c.c. of ammonia. Filter and wash with 10 per cent. ammonia, ignite and weigh as $Mg_2\ P_2\ O_7$, and calculated to Mg O. The precipitate which now contains all the phosphorus, iron and alumina, is dissolved in hot dilute HCl, and diluted to 500 c.c. neutralized to just acid with ammonia, 10 grams sodium thio-sulphate and 1 gram sodium phosphate added and the solution boiled for 20 minutes. The aluminium phosphate is then filtered off, ignited in a porcelain crucible and weighed as $AlPO_4$ and calculated to Al_2O_3. One hundred c.c. of the ore solution is now drawn by pipette, run into a 300 c.c. flask, reduced with granulated zinc for two hours, acidulated with a little dilute H_2SO_4, filtered into a large flask and titrated with decinormal $KMnO_4$ solution, each c.c. of which is equivalent to .00056 gram of metallic iron. The remaining 100 c.c. of ore solution is evaporated down to 50 c.c. and 5 c.c. of 10 per cent. barium chloride added just after boiling, and the sulphur precipitated as $Ba\ SO_4$ and filtered and weighed after ignition.

There are the usual determinations made in iron ore analysis and for routine work will be found to give accurate checks when run in duplicate. Combined water can be determined by heating one gram of ore red hot for 30 minutes, weighing and dividing the weight of water loss by 1, multiplying by 100, giving

the per cent. The only novelty about the famous Wabana ore from Bell Island, Newfoundland, is the fact that it carries traces of vanadium. Some of the imported Spanish ore, namely, Carthagena, carries a little galena. The other ores are native and Swedish of great purity.

WORKING COSTS OF MINES, AS PRACTISED ON THE RAND.

By John A. Dennison, Member.

(Paper read before the Institute of Mining and Metallurgy.)

Mining is essentially a commercial business and therefore should be conducted on lines which approximate as closely as possible to the recognized forms of established businesses.

Accounts are kept for four principal reasons:

First.—For the convenienec of the manager of the mine, who naturally has to follow the cost of each department closely.

Second.—To enable consulting engineers and controlling firms to see the cost of each branch of work, both on the surface and underground, with a view to cheapening or improving such work.

Third.—To supply Government with statistics.

Fourth.—To enable the mine owner or shareholder (who frequently knows little about mines) to see how his business is progressing, the amount of profit made, or the dividend he is likely to receive.

"Simplicity" in mine accounts should be aimed at, as it means less staff, less cost, and renders the accounts more easily understood by the owner of the business, i.e., the shareholder.

The following notes touch on the main controversial points in working costs of gold mines, particularly on the Rand:

Capital Expenditure.—All initial expenditures on machinery and plant, buildings, dams, shafts, development, head-gears, etc., up to the time of crushing is of course capital expenditure, from money provided generally from working capital shares or loans. Any surplus working capital that there might be would soon be spent in completing the plant, and in improvements. The trouble arises after the plant starts producing, when all the working capital is exhausted, how to deal with the further expenditure on similar items which goes on more or less during all the life of the mine, i. e., whether to charge it to capital account or to working costs. If the items are large (duplication of mill, new vertical shaft, new cyanide or slimes plant), and the necessary money is raised by a new issue of shares, debentures, or special loan, such expenditure is generally considered capital expenditure. But if the items are smaller ones occurring and recurring during the life of the mine, and are paid out of the profits, the mine owner or shareholder will, so far as he is concerned, consider them "working costs," i. e., as the difference between the revenue and the net profits he receives. It does not really matter much to the shareholder how the expenditure out of the revenue is allocated, so long as he can see at once by glancing at the monthly or annual reports how much net divisible profit has been made. So that in such reports it is essential that when some of the expenditure is charged to capital account the working costs and profit should not be shown alone, but the capital expenditure and net profit should also be shown.

The ideal method, and perhaps the simplest (though only adopted in a few cases) is to close all capital accounts when the plant is complete and running, and the original working capital is exhausted; and not to re-open them except for special expenditure of money specially raised.

Working costs naturally vary in different countries, on different fields, and also on the same fields; in the latter case, owing to relative size of plant, hardness of rock, dip and thickness of reef, etc., But many managers are more or less driven by directors or the public to show low working costs, as it is unfortunately often considered that low working costs mean good management, whereas of course they often mean poor policy, and slightly higher costs might result in additional net profit.

Such pressure, however, whether direct or indirect, often drives a manager to charge as much as possible to capital account, and as little as possible to working costs, both for his own sake, and sometimes possibly for "window dressing," in order to show a large working profit. Each manager has his own ideas as to what constitutes capital expenditure, and sometimes managers differ very widely in their methods and ideas.

Looking at a mine again as a commerical business, it seems necessary or advisable that "working costs" should in some way reflect the amount of capital exneded, either through "depreciation" or interest and redemption of loans, etc. The prevalent practice, however, seems to be not to include "depreciation" in working costs, even when it is allowed for, but to write it off "premium on shares" account, or some other equally useful account, so that it does not directly show in costs. It therefore follows that costs of 20s. per ton may be very good if only £500,000 have been spent on equipment, etc., but very high if £1,000,000 have been spent. The consequence of the usual practice of making no allowance for depreciation or redemption of capital in mine costs is that it is often impossible to see how much real profit is being made; in fact, in cases where working capital shares have been issued at a premium the profits or dividends often seem large on the nominal capital, but would be much smaller on the total amount of money raised for working capital, and still smaller if on the total amount spent, including capital expenditure out of profits, which in time amounts to large sums. Sometimes, indeed, if the whole expenditure were considered, the "profits" shown would not be sufficient to redeem the capital, much less pay interest on it. Curiously enough, money spent on capital account is often looked

upon as additional working capital raised, i. e., that interest on and redemption of such money must be allowed for before the additional plant can be correctly said to have produced any additional profit.

Capital Expenditure.

Capital expenditure on the Rand may be divided into two groups:

1. Initial expenditure to bring a mine to the producing stage.

2. Subsequent expenditure.

1. The initial expenditure may be divided into four headings:

(a). Property Account.—No depreciation is allowed for this in balance sheets or working costs; and it stands at its original cost right through the limited life of the mine, though the exhaustion of ore makes it less and less valuable.

(b). Machinery and Plant, Buildings, Dams, etc.—In some cases depreciation is written off every year to premium on shares account, or appropriation account, in other cases not at all, it being considered that as the money has been spent in bringing the mine to the producing stage, depreciation of the account would mean the creation of a cash reserve and payment of smaller dividends, if it had to be debited to profit and loss account.

(c). Shafts.—All initial expenditure on vertical and inclined shafts is left as an asset in the balance sheet, i. e., neither depreciated nor redeemed.

(d). Development.—In the largest group of mines initial expenditure on development, i. e., sufficient to bring the mine to the producing stage, is not written off, depreciated, or redeemed at all, it being decided to keep ore reserves to this or a higher level by current development, which is charged direct to working costs.

In many other mines this initial expenditure on development is debited to what is practically a capital suspense account, and is used for calculating current development redemption rates, eventually being redeemed during the last two or three years of the mine's life.

In other cases—by fixing the rate of redemption slightly above the average cost—this account is gradually extinguished, after which the ore reserves form an asset for which no credit is taken, and all current expenditure on development goes to working costs.

As regards—

2. Subsequent capital expenditure, i. e., after the milling stage is reached, there are many methods employed, and each mine management has its own ideas as to what constitutes capital expenditure. Any new expensive machinery, increase of plant or buildings, or new shaft, is charged to capital account, all repairs and renewals being charged to working costs. Sometimes a manager is given an allowance of £500—£1,000 per month (chargeable to working costs) for renewals of machinery and plant, and he has to make this sum do; this is a good arrangement in some cases, but it breaks down when any heavy expenditure is necessary. Some mines on the Rand have at times closed their capital accounts altogether, all further expenditure being charged to working costs; but most of them have at later dates re-opened the capital accounts for various reasons.

The chief trouble is in regard to inclined-shaft sinking, cutting stations, driving, winzing, raising, cross-cutting, box-holing, etc. In one large group of mines all such expenditure is called "development" and is charged to working costs monthly, care being taken to spend as far as possible an equal sum every month sufficient to keep the ore reserves up to a fixed standard (2—3 years ahead of the plant), and generally to increase the total tonnage gradually. This system deserves consideration, as it is the simplest, and gives the shareholder the clearest idea of the position.

Another favorite system on the Rand is to consider all current sinking of inclined shafts, cutting stations, and sometimes main cross-cuts, as capital expenditure, and not as "development." In such cases only the costs of driving, winzing, raising and box-holing are considered to be "development," and these are debited to a separate capital account, which is practically a suspense account.

At stated intervals, the total sum standing at the debit of this account, say £150,000, is divided by the total tonnage of milling ore estimated to be developed (after allowing for sorting out waste), say 1,000,000 tons, and the resulting figure of say 3s is charged to the next month's woking costs per ton milled. In many cases this figure is altered monthly, according to the rough estimates of tonnage "developed" by driving only, i. e., each foot of driving is calculated to develop a certain tonnage acording to length of "backs," etc.

Some mines carry this system farther, and eliminate from the calculation the milling ore obtained from development drives, etc., thus redeeming monthly only the portion of tonnage milled which came from the stopes. Even this is not strictly accurate, as it does not allow for the sorting out of some of the development rock.

The aim of this system of development redemption is, of course, to charge to the working costs of one month only the correct and fair proportion of the development expenses. The result is that, in pushing development ahead, a huge capital suspense account is created, which will doubtless be liquidated at the end of the mine's life.

The advantages of this system are obvious; the chief objection to it is that, even on the Rand, there is a considerable amount of poor and unpayable ore in the total ore reserves upon which the redemption rate is calculated, so that the payable ore, or the ore milled, is redeemed at the average cost of developing payable and unpayable ore together. It is admittedly difficult to calculate, even approximately, the total tonnage developed monthly, and still more difficult to calculate correctly the paying tonnage.

At annual valuations, corrections of 50,000 tons are occasionally made, and a large tonnage of developed ore is sometimes lost through caving-in stopes. Even on the Rand, blocks of ore which appear to be payable from development asays, are often found to contain a large proportion of unpayable rock. Certain standard factors, such as the percentage sorted out, stope widths, dip, etc., are used for the monthly calculation of tonnage developed, but the actual figures frequently differ from the standard ones.

It does not, therefore, appear safe to calculate development redemption on a strict mathematical basis, and, in my opinion, the rate adopted should not only be the total expenditure divided by the probable tonnage of payable ore, but should also allow a considerable margin for safety, thus gradually extinguishing the development capital account.

As regards Shaft Sinking and Main Cross Cuts: I submit that the cost of current work after milling starts should be included under the heading of "development," and be dealt with in the same manner. Theoretically, perhaps, in a mine with a defined boundary line in depth, the last 100 feet of shaft sinking, say from the 23rd to the 24th level, should be charged against the tonnage developed by that footage, and the 100 feet between the 22nd and 23rd levels would be charged half to the ore between these levels, and half to the ore between the 23rd and 24th levels. Thus the lowest or 24th level ore would have to bear a proportion of the cost of the whole shaft down to the 23rd level, as well as the whole cost between the 23rd and 24th.

For example, supposing an incline shaft cost £30 per foot for 2,400 feet, levels 100 feet apart, the ore developed down to the 1st level would be debited with only 1-24 of the cost of the 100 feet of shaft, viz. £125, the remaining £2,875 being charged to a capital suspense account, while the ore in the lowest 100 feet of the mine would have to bear the cost of 100 feet of shaft, viz., £3,000, plus its proportion of 2,300 feet, viz., £8,325, on a total of £11,325.

Even this large total would be insufficient, as the cost of sinking increases somewhat with depth. The impossibility of calculating the exact length the shaft will reach, and estimating whether payable ore will be found all the way down, even if lateral boundaries are parallel and the width of reef constant, preclude the acceptance of this method, in its entirety at least; and the consequent separate suspense accounts involved for the ore developed by each level would lead to hopeless complications.

Note.—This system might be possible on the Rand, but would naturally be impossible for ordinary mining where the ultimate depth of the shaft is quite unknown.

Therefore, it seems more advisable that the cost of sinking the incline shaft from the surface, or from the bottom of the vertical shaft, to the first level should be borne entirely by the ore developed by that level (obviously such ore could not be developed without it), and the next 100 feet charged to the second level ore, and so on. Here again the book-keeping involved would be far too complicated; the money has been spent, however little or much ore may afterwards be developed from it, and therefore the system of charging the whole cost of current shaft-sinking direct to development and to working costs seems the best and safest; unless, perhaps, one charges out a sufficient average sum per month to pay for a year's shaft-sinking.

As regards Additions and Renewals to Machinery and Plant, beyond ordinary maintenance, after the initial plant is completed, the system adopted should depend upon whether the money is provided out of profits or raised separately. If raised by means of an issue of shares, it would doubtless be considered capital expenditure, and in some cases depreciation would be charged somewhere in the balance sheet or appropriation account, but, according to present practice, would not show in working costs.

If the money is raised by an issue of debentures or a loan, under the present system the interest is sometimes charged to working costs, but generally to an appropriation account, and the redemption of the debentures or loan is not shown in working costs. The result of this system is that capital expenditure goes on year after year, especially in directions that will show any decrease in "working costs"; the decrease generally follows, but as the costs contain no portion of the extra expenditure it is almost impossible to tell whether the saving in costs has been sufficient for the interest and redemption of the additional expenditure.

Personally, I think the system of a monthly allowance in working costs for additions to plant and machinery is in most cases the best, provided this allowance is used as a fund which is only overdrawn in exceptional cases. If by this means the plant is maintained at full value there would not appear to be the same necessity for depreciation.

Depreciation.

Depreciation on original machinery, plant, buildings, etc., is a very vexed question. Generally speaking, companies whose head offices are in London are compelled by their auditors to write something off annually for this, but it is rarely shown in working costs. Companies with head offices in the Transvaal and elsewhere seem to do more as they like, and frequently no depreciaton is written off.

Profits Tax.—This is never included in "working costs;" there seem to be many reasons which can be adduced for and against this system.

Stores on Hand.—This item in the balance sheet should include only such stores and spares as are suitable for current requirements. All accumulations of discarded appliances or deteriorated stores should be written off every few months, the loss being charged to "working costs" in average monthly instalments. As it now stands the depreciation on this item in many cases is in reality very large, and should, I submit, always be charged to working costs. In Australia, I believe, a representative of the auditors personally checks the stores on hand annually, and this seems in some respects the best method; but as far as I am aware, no valuation by outside parties takes place in the Transvaal, California or Colorado.

Suspense Accounts.—Some few mines manage to do without these accounts (which are never disclosed in the monthly or quarterly reports issued to shareholders, and are very rarely disclosed clearly in annual reports), but on the majority they seem to be regarded as necessary evils, and at times they are almost unavoidable. Annual payments for fire insurance and licenses, as well as recruiting fees for native labor, etc., are generally charged to suspense accounts and working costs debited monthly with a proportion. They are also used for sundry repairs, small renewals, conveyor belts, etc., and frequently amount to large sums, which are partially liquidated when an exceptionally good month affords an opportunity

Such accounts are very useful and are perhaps allowable under strict supervision, but the ideas of managers differ very widely as to the items debited to these accounts and the time allowances for repayment. The object is, of course, to show regular working costs as low as possible. At times, when inspecting mines, I have had some difficulty in ascertaining the full amount of such suspense accounts,, especially when, owing to a complicated system of dual control, some of the accounts are kept at the mine and some at the head office; but they often account for some of the difference between the published monthly profit and the improvement in the cash position.

Gold Reserves.—Most of the Transvaal mines have kept a certain amount of undeclared gold in reserve during the past few years with a view to showing regular outputs; at times these reserves have amounted to as much as 10,000 or 20,000 ounces, not kept at the mine, but realized by the bank in the ordinary way, credited to the general account, and in many cases the money has been spent. The legality of such a course has been questioned, and some mines have now abolished the system; others continue it, but publish the position of the reserve at the same time as the monthly or quarterly "profits"; and a few retain the original system of undeclared gold reserves, though the present tendency is to abolish the system. Without touching on the legality or propriety of the system I would point out that it leads to many regrettable complications in the accounts and reports.

The figures relating to value of ore milled, percentage of extraction, yield per ton, etc., in the manager's monthly or quarterly reports, are necessarily inaccurrate by the amount of the reserve added to or taken from the output, and actual results have to be modified to suit a policy of averaging. This practice considerably reduces the value of the published figures for comparing current results. A statement of the amount of the reserve gold at the annual meeting does not help a shareholder to gauge the real profit in any one month or quarter. Sometimes the value of ore milled and yield per ton only are altered, sometimes only the extractions and yield per ton; sometimes all three; so that it becomes difficult at times to follow the actual results.

Directors and consulting engineers therefore do not always get the actual figures which are necessary for a close scrutiny of mining operations, and are sometimes confused by the methods they themselves allow; and even managers have been known to be inconvenienced by the two different sets of results. On would think that the gold reserve would have to be shown in the annual report; but this difficulty was in some cases got over by including it in the item of "sundry creditors."

In addition to the above, there are of course minor elastic methods of regulating declared outputs, such as "cleaning up" cyanide works, etc., a few days earlier or later, occasional steaming of battery plates, reserve amalgam, and small rich patches of ore kept in reserve underground for assisting the output during the latter days of the month; but these items only occur at rare intervals, and do not amount to very much. It sometimes happens, too, that dividends declared for a certain period are facilitated by the fact that they are not payable until a month or so after the period has ended.

Head Office Charges.—These are sometimes included in working costs where the head office is near the mine, say in Johannesburg; in other cases they are not so included. This is a frequent cause of difference in working costs. Sometimes the management expenses, salaries of manager and consulting engineer, etc., are included in general charges under working costs; sometimes they are given separately.

Realization of Gold.—On the Rand this item of cost is frequently debited to gold account, the net yield only being shown the lowest possible in monthly and annual reports, thus showing the lowest possible working costs. In many other cases it is charged as a separate item or under general charges to working costs; and in one case it is deducted from the yield in monthly reports and included in working costs in the annual report.

There are many arguments for both systems, but from a mining point of view it seems very advisable to keep the proceeds of the sale of gold quite distinct from all charges, otherwise it affords no guide to the value won from the ore, and does not compare with the extractions.

From a commercial point of view, too, it would appear advisable to include it in working costs, otherwise one cannot easily see the cost of different methods of realization and the extra expense due to distance from recognized markets, nor the loss or gain due to the very varied fineness of the bullion shipped.

One of the results of all this straining after regular yields and proofs, and making a fetish of low working costs, is seen in the fact that annual dividends only amount to 70 to 80 per cent. of the monthly declared profits of the Transvaal mines, presumably to some extent also on other mines.

It seems impracticable to lay down rules for guidance as to how the smaller details of working costs are to be kept in mines all over the world, as the conditions vary so much on different fields and in different mines on the same field, and according to the metal mined. Questions such as the method of pay-tickets, the points where the surface tramming begins and ends, the allocaton of power and labor costs, etc., are all dependent upon local conditions. Moreover, the books of Messrs. A. G. Charleton, Nicol Brown, Prof. James Lawn, and others, give ample guidance in regard to detailed systems that are advisable when they can be adopted.

My idea is that the Standardization Committee might think it wise to confine its questions and ultimate recommendations to principles and large systems such as I have outlined, rather than enter upon an endless discusion of minute details which would be still more difficult to bring into line. It may be argued that most of the points referred to herein are matters to be settled by boards of directors and auditors rather than by managers or consulting engineers. It seems to me, however, that it is of vital importance to the latter to have their working costs kept in such a way that they can easily see the full actual cost of their operations on a commercial basis.

In most cases, too, the directors or financial committee allow a great deal of discretion to their managers or consulting engineers in these matters; and in any case the latter always have considerable influence which can be exercised in straightening out such questions.

Every manager would, I feel convinced, prefer his working costs to be kept on a simple inclusive basis, but for the continual demand, expressed or implied, for low "working costs."

Directors would also benefit by simplicity in costs, except for the glamor of low "nominal" costs and high "nominal" profits; and reports and cost sheets would be easier to grasp.

Shareholders, too, who after all are the owners of the mines, would much apreciate simple inclusive statements of working costs which they could understand In fact, the nearer the dividends coincide with declared monthly profits, the more pleased will shareholders be, as their usual way of adding up monthly declared profits and calculating on receiving the full amount in

dividends often lead to disgust; and anything which may prevent the ordinary shareholder from seeing clearly the actual progress of his venture is, I think, to be deprecated. In the long run, mining engineers and the mining industry can only suffer from such a procedure by the undue loss of public interest.

Up to quite recently the book-keeping and statistical staff of each mine on the Rand has been very large. In addition to statistics for the manager and each department head, endless statistics have to be prepared for the consulting engineer and the controlling firm, as well as for the government and Chamber of Mines. All of these entail expense, as the costs have to be allocated in order to fit each system. In fact, more than one manager has mentioned to me that the head office officials seem to consider that the mine ought to be run to suit the system on accounts instead of vice versa. There is now, however, in some quarters, an attempt to curtail some of the statistical work.

In contradistinction to this plethora of statistics, much might, I think, be learned from the systems in use on Californian mines. I visited one mine there (where a 60-stamp plant was in full swing) and noticed that one man acted as secretary, surveyor and assayer. The statistics kept were very simple, everything spent went straight to working costs and the latter were amongst the lowest in the State.

I would, therefore, again urge that, in making recommendations for the standardization of working costs, the objects to be aimed at should be simplicity, and that calculations of development, redemption rates, etc., should not be made to the third place of decimals, but that a large margin of safety should be allowed for the well known uncertainties of mining, even on the Rand.

In conclusion, I should like to state that, although for the purposes of the committee it has appeared advisable to mention some of the little inconsistencies and variations in the systems in use on the Rand, which I hope will be straightened out in time, yet I think it is agreed that mines on the Rand are more generous than most other gold mines in the amount of detailed information they give shareholders and the public; and I have so much admiration for the system of mine accounts and cost sheets in use on the best-regulated mines of the Rand, that I consider their system, with certain necessary modificatons, would form a useful basis for the standardization—as far as may be considered practicable—of mine accounts and cost sheets on gold mines throughout the world.

LIST OF THOSE TAKING PART IN THE SUMMER EXCURSION C. M. I. AS AT JULY 16, 1908.

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THE IRON ORES OF CANADA.

By C. K. Leith, University of Wisconsin, Madison, Wis.

(Ottawa Meeting of the Canadian Mining Institute, March, 1908.)

I hasten to disclaim intention of attempting a comprehensive discussion of all known Canadian iron ore deposits. While I have seen most of the principal deposits in Canada and Newfoundland, and others have been examined by associates and assistants, I cannot claim to have sufficiently detailed knowledge of a considerable part of them to warrant detailed discussion. tention will be called rather to certain general features of comparison of Canadian ores with the several types of deposits of the United States which have been more fully exploited and studied, and thus view the Canadian iron ore situation with a perspective not otherwise easily gotten. For the purposes of this discussion, the Newfoundland ores are included with the Canadian ores, because they are controlled, mined and largely used by Canadian interests. So far as is necessary, information will be drawn from the various careful descriptions of Canadian ores published by the Dominion and Provincial Geological Surveys or Mining Bureaus.

The classification of iron ore deposits we shall use is partly a new one based upon recent detailed studies of the Lake Superior ores and ores of the Western United States.

All metallic ores are derived ultimately from the interior of the earth, whence they are delivered by igneous eruptions near or to the surface, there to undergo various distributions and concentrations under the influence of meteoric waters and gases. The variations in composition, shape, and commercial availability of an ore are controlled by variations of conditions under which the ores have reached the surface and have been distributed. The variations have developed the following types of North American iron ore deposits:

(1) Magmatic Segregation Type.—Ores brought to the outer part of the earth in molten magmas but retained in them during crystallization, with the result that the ores form part of the rock itself, just as do the feldspar and other minerals. Such are the titaniferous magnetites, containing refractory silicates, and frequently sulphur and phosphorus, in deleterious quantities. While known in enormous quantities over North America—in Canada principally along the Lower St. Lawrence river, and in the Chaffey and Matthews mines of Lower Ontario—smelting is not beyond the experimental stage and they are nowhere used at a profit.

(2) Pegmatite Type.—Ores which are carried to or near the surface in magmas and are extruded from them, in the manner of pegmatite dikes, after the remainder of the magma has been partially cooled and crystallized. They are deposited from essentially aqueous solutions mixed in varying proportions with solutions of quartz and the silicates. To this class belong some, and perhaps all, of the magnetite deposits along the contacts of limestone and igneous rocks constitutting the greater part of the iron ores of the Western United States, and most of the magnetite ores of Vancouver and Texada Islands, and elsewhere in British Columbia. The assignment of the British Columbia magnetites to this type is based on a personal comparison of them with ores in Southern Utah believed to be of this type, the origin of which is discussed in some detail by Mr. Harder and myself in Bulletin No. 338 of the United States Geological Survey. The essential features of these deposits are their highly crystalline, magnetic character, their content of garnet, amphibole and other silicates, local abundance of sulphides and of apatite. The area of these deposits at the surface varies up to about 0.2 of a square mile. They are easily located by their outcrops or by the fragments strewn down the slopes, but it is not so easy to determine the shape and extent of the deposits when found, because of their extremely irregular association with wall rock. It is not safe to assume that they extend a foot beyond the zone of direct observation. Their vertical dimensions and shape and their mineralogical composition at depth are relatively unknown. Mining operations in the west on this class of deposits have not been extensive enough to determine these facts, such deposits having been mined principally in but few localities, at Texada Island, at Fierro, New Mexico, and in the Monterey and Durango deposits of Mexico. In the United States and Mexico certain similar deposits, but not all, have been found to take on pyrites and garnet with depth.

A small amount of ore has been mined from Texada Island. The better ore averages about 55 per cent. iron content, and from this down; much of it is below Bessemer limit in phosphorus, and sulphur is in amounts requiring roasting. Garnet and amphibole are both abundant, locally requiring hand sorting. Silica varies, inversely as the iron, up to about 11 per cent. All of the ore contains a small amount of copper, locally as much as 4 per cent. The shapes of the deposits are extremely irregular. Seldom do the widths exceed 100 feet. In depth they are best shown by a tunnel 300 feet below the surface which discloses ore with essentially the same width and composition as at the surface.

The ores on the west coast of Vancouver Island have had only a little development work done on them. They likewise vary widely in iron content; phosphorus is low, sulphur is usually high, silica varies up to about 26 per cent.

Making due allowances for lack of development and possible shallowness and change of character with depth, it is still certain that there is a large known tonnage available in British Columbia, which will be used when West Coast demands warrant the establishment of a local steel industry, instead of the importation of finished products from the east. There are indications that this time may not be far distant. While suffering somewhat from their composition, they are easily and cheaply mined, and being located directly upon the coast, will have the cheapest transportation. So far as the ores have been used only in the State of Washington, and the recent rapid development of the Northwestern United States suggests that their further immediate use will be in Washington, notwithstanding duty, at least until such time as sufficiently large ore reserves in this part of the United States become developed or until the population of British Columbia requires a steel industry of its own.

To the pegmatite type are provisionally assigned the ores of the Atikokan and Hutton districts, of Ontario,

where the magnetites have the mineralogical and chemical constituents of this class and show such intimate relations with greenstones as to suggest a direct derivation from them. They lack the bedded structures, characteristic of ores of class (3) to be described, though in the Hutton district the bedded iron formation rocks are also present. The extremely irregular association of the ore with greenstone makes it difficult to outline the deposit even a few feet in advance of exploration. The Atikokan deposits are high in sulphur, 2 to 5 per cent., requiring roasting. At Hutton the sulphur is low so far as explorations yet go, and phosphorus runs about 1 per cent.

To this class of ores also may belong at least a part of the magnetites in the pre-Cambrian Grenville series of New Jersey[1], some of the magnetites of the Adirondacks of New York[2], some of the magnetites in the Grenville series of Southeastern Ontario[3], and the magnetites of Cornwall, Pa.,[4] and Cranberry.[5]

These deposits have essential features in common and mineralogical and chemical similarities to the western ores of this class It may be that part of the Ontario Grenville ores belong rather with the following class (3), suggested not only by their characteristics, but by Dr. Miller's recent correlation of certain associated rocks with the Keewatin series of the Lake Superior region, which contains ores belonging to class (3).

The Grenville ores of lower Ontario are interbanded lenses of magnetite, gneisses and amphibolites, closely associated with, and partly in direct contact with, crystalline limestones of the same series. The ores vary from lean unworkable magnetite gneiss, carrying a small percentage of magnetite ribs as compared with gneissic ribs, to deposits of nearly pure magnetite. The iron formation bands are lens shaped and discontinuous. Their greatest width is probably less than 150 feet. They have been mined to a depth of 350 feet, but most of the workings are less than 100 feet. The better grade ores average much the same in iron as the better grade western magnetites of this class, that is about 55 per cent., and from this down. Phosphorus is usually below the Bessemer limit, adding much to the availability of the ores. Sulphur is usually too high to allow the ore to be used without roasting, seldom running less than .05 per cent., though by hand cobbing the sulphur content may be kept down somewhere near this limit. Concentration of certain of the leaner grade ores is likely to be commercially feasible in the future, though this is yet a moot question, especially with reference to the satisfactory elimination of sulphur. In a few places titanium is present.

Hematite has been mined at Wallbridge, Dalhousie and McNab in Eastern Ontario in similar geological relationships. According to Willmott,[6] there is reason for believing that they are oxidized portions of iron pyrites bodies lying below.

A deposit of magnetite not far from Bathurst, New Brunswick, seems from its available description[7] to belong to this class of pegmatite ores, but I do not have sufficient information to discuss it.

(3) Lake Superior Sedimentary Type.—Ores brought to the surface by igneous rocks and contributed either directly by hot magmatic waters to the ocean or later brought by surface waters under weathering to the ocean or other body of water, or by both; from the ocean deposited as a chemical sediment in ordinary succession of sedimentary rocks; and, still later, under conditions of weathering, local enrichment to ore by percolating surface waters. To this class belong most of the producing iron ores of the Lake Superior region, those of the Michipicoten district of Canada, and most of the non-producing banded iron formation belts of Ontario and Eastern Canada. The Lake Superior ores constitute the world's largest reserve of high grade hematite, more or less hydrated, much of it of Bessemer grade, and little of it high either in phosphorus or sulphur.

The ores of this class differ in origin from those of the preceding classes in that the iron, instead of being directly deposited near igneous rocks as ore, is distributed by the aqueous sedimentation and deposited with a large amount of interlayered silica in banded "iron formation," containing about 25 per cent. of iron, too poor to be used directly as ore, and requiring that the silica be locally taken out before they are of value. This ore may or may not show close areal association with the parent igneous rocks. It is obvious that gradation phases are to be expected between groups (2) and (3), and that many ore deposits can with difficulty be assigned definitely to one or to the other.

It has long been known that the Lake Superior ores were concentrates in certain sedimentary iron formations. It was believed that these sedimentary iron formations were derived from the weathering of basic shores containing much basic igneous rock usually called "greenstone." As a result of further study it has been found necessary to conclude that the iron formations have not only been derived from greenstone by weathering, but have actually been contributed by greenstone magmas directly to the water in magmatic solution and that there are all intermediate stages between the two processes. It begins also to appear that the iron, copper, nickel and silver ores of the Lake Superior and Lake Huron districts are related in a great metallographic province in which the characteristics and distribution of the different ores are initially controlled by igneous rocks.

This conclusion has an essential bearing on exploration, for if the iron is specifically related to certain greenstones, just as the Sudbury ores are to the norite, then it follows that its distribution may be somewhat freakish, as it is in any ores related to igneous activity, as for instance, the gold ores of the west, and that it cannot by concluded from similarity in succession or structure that iron ores should necessarily be found in a distant district, though the redistribution as sedimentary rocks which the iron ores alone have undergone has greatly increased their area and the chances of finding them.

As first deposited the iron formation consisted essentially of chemically precipitated iron carbonate or ferrous silicate (greenalite) with some ferric oxide, all minutely interlayed with chert. When these were exposed to weathering, the ferrous compounds, the siderite and greenalite, oxidized to hematite and limonite, essentially in situ, although some of it was simultaneously carried and redepoisted. The result was ferruginous chert called taconite or jasper, averaging less than 30 per cent. of iron. The concentration of the iron to 50 per cent. and over has been accomplished principally by the leaching of silica bands from the ferruginous chert and jasper. Infiltration of iron has been on a smaller and more variable scale. The leaching of the silica develops pore space, and allows the iron layers to slump, thereby enriching the formation sufficiently to constitute an ore.

It has been found, further, that during this leaching of silica the character of the iron bands has not essentially changed and therefore that the nature of the ore deposits is determined largely by the character of the ferruginous chert. The phosphorus is in the iron bands, rather than in the chert, and therefore the leaching of the chert tends to raise the percentage of phosphorus in the ore, but there has been also later introduction of phosphorus, making the phosphorus content of the ore considerably higher than that of the parent rock.

For flat-lying formation such as the Mesabi from 4 to 8 per cent. of the surface of the formation and less than 2 per cent. of the volume of the part of the formation lying vertically below this exposed surface have been altered to ore. For steep dipping formations like the Gogebic, about the same percentage of the volume has been altered to a depth of 2,000 feet.

There are a number of other facts of both scientific and commercial interest, especially relating to the quantitative determination of the various factors which have entered into the development of the present known deposits, which will be published by the U. S. Geological Survey, in a general monograph, by C. R. Van Hise and C. K. Leith and others.

I have discussed the Lake Superior ores only so far as necessary to bring out certain essential features of this class of ores in Canada and their bearing upon availability. There are many iron formation belts of this class, but they have been found to have undergone local enrichments to important ore deposits only in the Michipicoten district, and to some extent in the Animikie district.

In the Michipicoten district the ores are principally non-Bessemer and in portions of the deposits high in sulphur. Their occurrence beneath the peculiar Boyer Lake basin with walls of chert, tuff and carbonate, is well described by Coleman and Willmott.[8]

In the Animikie district the iron formation is an eastward continuation of the Mesabi iron formation, but it is less than 200 feet thick, as compared with 700 to 1,000 feet in the Mesabi, and has undergone enrichment only in thin layers interbedded with cherts and along a few fault planes. The thickness of the ore beds that may be mined will depend on how low a grade can be used and the success of hand sorting in keeping the ore up to this grade. Under any conditions much rock must be handled. On the other hand, the ores have great horizontal extent, are near the surface, are red hematite, low in phosphorus, with low sulphur, and practically on the shore of Lake Superior, justifying the hope that they may be used.

Two important questions remain to be solved in connection with the lean iron formation of the Lake Superior type so widely distributed in Ontario and elsewhere in Canada: (1st) Is their apparent lack of second concentration a real one? and (2nd) if so, what has caused it? On the assumption that the apparent lack of concentration is a real one, Van Hise has suggested that perhaps a part of the enriched portions has been removed by deep glacial erosion. Another alternative is that the structural conditions have not favored abundant flow of surface waters necessary for the leaching of the silica. A third possibility here most favored is that the original texture of the iron formations or proportions of the original constituents have been somewhat different from those of the Lake Superior region, and that they have not allowed access to the waters necessary to leach the silica. The formations are principally Keewatin and in general are more dense, crystalline and magnetic than the Huronian iron formations of the Lake Superior region. Some of these differences are doubtless due to secondary alterations, but it is not easy to account for all of the differences in this way. It is a significant fact, noted by Willmott,[9] that only 7 per cent. of the ore in the Lake Superior region have come from the Keewatin series, and that the Upper Huronian series, carrying 71 per cent. of the total, is not widely represented in Canada.

All these explanations and posibly others may apply. On the other hand, much more exploration is necessary to show that there really has not been concentration of large ore deposits in the known Canadian iron formations. The fact is again cited, that, in the producing Lake Superior districts, the proportion of ore, even under most favorable conditions, constitutes less than 8 per cent. of the surface of the iron formation and usually much less, and in volume it constitutes less than 2 per cent. Only rarely have the ores been discovered at the surface. Underground exploration through drift and rock has been necessary. In but few localities in Canada has there been adequate search for these localized concentrations within the iron formations. This fact is sometimes lost sight of because of marked tendency to use the term "iron ore" for the banded, unconcentrated "iron formation," and to speak of such formation as "lean, banded ore." In the Lake Superior region "iron formations" and "iron ores" are discriminated. It is not impossible that mechanical concentration of the iron formation may result in the production of ore, but it is unnecessary to argue the commercial advantage of finding some part of the iron formation in which nature herself has done the concentrating.

(4) Clinton Sedimentary Type.—Sedimentary ores deposited in oceans from weathering of the land areas in which the iron is either disseminated in igneous rocks or has undergone some of the concentrations outlined in (1)((2) and (3). To this class belong the "flax seed" ores of the Clinton and other beds of the Appalachians and Wisconsin, the ores of the Torbrook and Nictaux areas of Nova Scotia, and those of Bell Island in Newfoundland. They have now been discovered in Missouri.[10] They are also believed to differ in origin essentially from those of the preceding classes in that they are immediately derived by weathering processes, that they were deposited in the ocean as iron oxide rather than as ferrous salts, and that they have undergone no further concentration, being mined essentially in the condition in which they were deposited. There has long been some doubt as to whether or not these ores might not represent two concentrations, but work in the Southeastern United States by Eckel, Burchard and others,[11] for the U. S. Geological Survey, and our own observations in Wisconsin, seem to show one concentration.

On Bell Island the ores are beds dipping about 9 degrees to the northwest, in two main seams. The lower or Dominion seam averages about 10 feet in thickness, though variable, and extends across the island for about 3 miles along the strike and down the dip for perhaps half a mile, covering an area of 818 acres, although not productive for this entire area. The upper seam occupies an area about 1 by 1-3 mile (240 acres), averaging 7 feet in thickness and is not all productive. The mining has been largely open pit, but is becoming more largely underground as the ore is followed down the dip. They are now being followed under the ocean by

drifting. Much of the upper bed averages about 52 per cent. in iron, and the lower bed about 50 per cent. Recent shipments are reported to be under 50 per cent. Phosphorus averages 1 per cent. The ores are adapted to basic Bessemer or open hearth treatment, and for the former receive a bonus for high phosphorus from some European consumers.

In the Torbrook and Nictaux areas the ores are of similar kind, but the beds differ from those of Belle Isle in being thinner and inclined, requiring deep mining and handling of waste rocks.

Ores of this kind occupy a definite stratigraphic position, are easily explored for, and so far as their future in Canada is concerned, they have already been pretty well discounted.

(5) Carbonate Ores, derived from weather of rocks, transporated and deposited with organic reducing material in bogs; now found in thin beds usually associated with coal seams or carbonaceous shales. These have been extensively mined in the coal bearing and adjacent areas of the Eastern United States, but not in Canada. Their present production in the United States is almost nil. Where exposed to weathering they alter to limonite or brown ores, considered under the following heading. Iron carbonates constitute minor phases of class (3).

(6) Brown or Hydrated Ores, developed either from the weathering of iron carbonates mentioned in the preceding heading, or of limestones containing carbonate or other iron minerals, or by replacement of limestones or by deposition in glacial drift, or by bog deposition, or by some combination of them. The few limonites in class (3) are not here included. Being often residual products of weathering, they are characteristically mixed with other residual products of weathering, particularly clay. To use these ores it is necessary to wash out the other residual products, a process which nature neglected to attend to. The ores are characteristically hydrous and high in phosphorus, but when washed are found highly suitable for open hearth furnace practice.

The bog ores of Quebec presumably belong to this class.

Related to classes (5) and (6) are the Londonderry ores of Nova Scotia, consisting of carbonates of iron, calcium and magnesium, showing more or less alteration to limonite in irregular vein-like masses, in slate and quartzite. These ores are low grade, fairly high in phosphorus, manganese and silica, and are extremely irregular in their shape and distribution. Their origin is in doubt.

(7) Magnetic Sands.—Magnetic sands are developed from the erosion of classes (1), (2) and (3). As exposed along the lower St. Lawrence river they seem to be principally from classes (1) and (2), and are therefore high in titanium. They form beds from ½ inch to 2 feet in thickness, with wide extent. Their availability is still in doubt.

Commercial Importance of the Several Classes of Ores.—The proportions of the several classes of ores mined in the United States, Canada, and Newfoundland for 1906, appear in the subjoined table. Where the origin of the deposits is in doubt, the classification of their production is in doubt but the production from such types is too small to introduce any essential error into the figures given.

Production of Iron Ores in 1906.

	U.S.	Canada and Newfoundland.
Class 1. Magmatic .. segregation (magnetite)	.00	.0
Class 2. Pegmatite type (magnetite)	5.2	
Class 3. Lake Superior sedimentary type (hematite)	80.	12.29
Class 4. Clinton sedimentary type (hematite)	8.	78.34
Class 5. Carbonate type	1.	
Class 6. Brown ore type (limonite)	5.8	8.51

The dominance of class (3) (Lake Superior ores) in the United States production shows how desirable it is to have the ores go through nature's concentrating mill. These are the only ores which have undergone second local enrichments. That the less desirable grades of ore should compete at all with the Lake Superior grades is due largely to lower freights between ores and furnaces, between fuel and fluxing materials and furnaces, and between furnaces and consuming centres. Iron ores differ from most other metallic ores in that their great bulk, as compared with their value, requires cheap transportation, which operates in develop certain low grade deposits well situated in this regard at the expense of better grade ores.

Turning to the Canadian production, it appears from the table that the proportions of different classes of ores mined are quite different from those of the United States, and that a far larger proportion of Canadian ores is being drawn from less desirable classes. The class which produces 86 per cent. of the United States production produces only 12.29 per cent. of the Canadian production.

It appears, therefore, that in order to compete with the United States on equal terms so far as grades of ore are concerned, Canadian ores of the Lake Superior type must be more largely developed. The proportions and amounts of ores of the Lake Superior type now mined in Canada are not far different from those of the United States fifty years ago, before the advent of high grade Lake Superior ores had revolutionized the industry. It is not meant to imply that Canada is fifty years behind the times in this regard, but rather to call attention to its latent possibilities for the future and probable direction of development. It does not follow that the production of ores other than of the Lake Superior class may not also increase, because of low freights or artificial aids in the way of tariff or for other reasons.

Similar conclusions seem to follow from a consideration of ore reserves. I fully realize the uncertain nature of estimates of undeveloped deposits and the wide variety of figures that may be gotten by conscientious observers with different points of view or different methods, but certain essential features of our knowledge concerning reserves are fairly well established and a brief summary of them will help to bring the Canadian iron ore situation somewhat more definitely before us.

The titaniferous ores of class (1) not being mined, there is no point in attempting to warrant estimates.

The British Columbia magnetites of class (2) have been subject to a wide range of estimates depending upon how low a grade of ore is included, upon the

depth arbitrarily assigned, and upon the extent to which isolated portions of deposits are assumed to be continuous. Using only the extents and depths known, the tonnage of ore of commercial grade may be measured in a few tens of millions.

The difficulty of estimating the Atikokan and Hutton ore of class (2) is due to their mixture of greenstone, making it impossible to predict in advance of exploration of extent of the deposits. In both districts the explorations show at least several millions of tons.

For the Lake Superior ores of type (3) in the Michipicoten district, Coleman and Willmott have estimated a reserve of possibly two millions of tons. Some of this reserve is of doubtful value because of high content of sulphur. In the Animikie district the tonnage is problematic because of conditions described for that district, but at best the ores to be recovered is not in large amount. The reports of hundreds of millions of tons of the Lake Superior type is various parts of Canada so frequently seen in print are without foundation except as they cover commercially non-available lean iron formation rather than ores. Even under the best conditions but a small fraction of the iron of these formations is likely to be in ore of commercial grade.

The Grenville ores of lower Ontario show wide variations of estimates, depending upon the factors chosen. The known dimensions of commercial grades indicate not more than a very few millions of tons.

The similar beds of Nova Scotia are so thin that only a part of them can be counted as commercially available. A commercial estimate has been four million tons to level of 700 feet on the principal group of properties.

It appears in general, then, that the poportion of reserve of Canadian ores of the Lake Superior type to the total reserve is probably not greater than the proportion of their annual production to total annual production. It is not held for a moment that the tonnage of some of these deposits to be ultimately developed may not be considerably larger than here indicated, but whether they be increased or decreased, it will be because of introducing factors of depth or grade partly common to all of them. This is not likely to change their proportion sufficiently to obscure the fact that the most desirable ores of the Lake Superior type of class (3) are not yet developed in large enough tonnage to insure the future competition of Canadian iron ores with those of the United States on an equal basis. In competition with the great reserves of high grade ores of the Lake Superior region the principal Canadian reserves thus far developed suffer handicaps in grade and in content of deleterious constituents. These handicaps are and will be overcome to a certain extent by bounties or locally by favorable conditions of transportation, but that they exist is shown by the extremely vigorous search for iron ore of the Lake Superior type by Canadian mining interests, by the importation of Lake Superior ore to the amount of 4-5 of the ore used in Ontario, and by the recent increase in proportion of ore imported to home production, due to Canadian demand for finished products having gone ahead of the production from Canadian ores.

That ores of the Lake Superior type are in larger quantities in Canada than are now known seems likely, in view of the position of the Lake Superior region as a mere southern fringe of the great Canadian area of the pre-Cambrian rocks. Their discovery will require clearer search than has been previously made in any but isolated localities, for it is not only necessary to find the iron formation, but to find the small fraction of this formation which happens to have been concentrated. The vast area, the difficulties of travel, and the drift covering, requiring drilling, all combine to make the task a difficult one and partly explain why the search is not farther advanced. On the other hand, exploration may never develop abundant ores of the Lake Superior type for geological reasons discussed under class 3.

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BOOK REVIEWS.

Rocks and Rock Minerals.—A Manual of the Elements of Petrology Without the Use of the Microscope By Louis V. Pirsson, Professor of Physical Geology in the Sheffield School of Yale University. 12 mo., V + 414 pages, 74 figures, 36 full-page half-tone plates. Cloth, $2.50 net (10/6 net). John Wiley & Sons, New York, 1908.

Not all mining men have an intimate knowledge of petrology, or the science of rocks. Even those who have had the advantage of a college course find that only a small residue of what they learned adheres to them.

Most text-books on the subject are cast into forms that repel the lay reader. Hence it is not easy for the beginner to acquire the rudiments of the science.

"Rocks and Rock Minerals" is an attempt to present the outlines of petrology in such a way as to give an intelligent idea of the subject to readers quite unacquainted with the microscopic standpoint.

Rocks and rock minerals are dealt with entirely from a megascopic, or practical outdoors, point of view.

The book before us attains the desired object of giving the reader a knowledge of rocks and rock minerals without recourse to the microscope. It is a very fair introduction to the study of geology generally. Part III, in which igneous, stratified, and metamorphic rocks are described, is an excellent treatise in itself. Simplicity is the keynote of the book.

A Guide to Technical Writing.—By T. A. Rickard, 127 pages. Price, $1. Mining and Scientific Press, San Francisco, 1908.

"Rules are useful, but the understanding of the reason on which a rule is based is better. No man can apply a rule intelligently until he understands when to disregard it." Thus writes Mr. Rickard in a prefatory note to this invaluable little volume.

Literary elegance is neither expected nor necessary in a mining engineer's report—and it is rarely discoverable in these documents.

As a record of facts and scientific deductions, engineers' reports and technical press articles are usually clear. But, not infrequently, this species of literature is turgid beyond description. Not only is it turgid, but it is abominably inaccurate and hazy.

One section of Mr. Rickard's book is entitled "Examples of Journalese." Here, clearly and briefly, the author gives instances of some of the most common inaccuracies and errors current in technical literature. We shall quote a few of these.

Lodes are often described to as being "permanent." "Persistent" is meant.

"Extensive" and "inaugurate," because of their mouth-filling qualities, are commonly chosen to replace the unassuming monosyllables "large" or "big" and "start."

"Installation, inaugurate, and prosecute are words that are the stock-in-trade of the boosters of wildcast."

Similarly the author. scores the unnecessary use of quotations from foreign languages. "The use of Greek or Latin, French or German, where Englsh suffices is a mark not of the literate, but of the pseudo-literate man."

That description and useful phrase "carries values" is condemned incontinently. Ores, or veins, do not carry "values;" they carry metals.

The chapter "Hints in Grammar" contains a most lucid explanation of the proper uses of "shall" and "will." Indeed, we cannot recall having read anything so clearly definitive. Particularly useful are the directions as to the correct use of singular verbs with such plural nouns as "500 tons of ore." "The idea is of a quantity of ore as a whole, all of which is treated in a continuous operation."

Among other minor matters the principles of punctuation, that bug-bear of the young writer, are set forth. The functions of the comma, colon, semi-colon, and the period are explained simply and well.

Questions of usage and of taste are not omitted. In this field Mr. Rickard may be followed almost implicitly.

Six maxims are presented as parting advice to the reader. They will bear repetition:

1. Have something to say; then say it.
2. When uncertain as to your grammar or phrasing, re-write the sentence or paragraph.
3. But do not tinker at a doubtful sentence; re-construct it thoroughly.
4. Avoid the use of words the meaning of which is doubtful to you.
5. Make your meaning clear; then consider style.
6. Remember the reader.

EXCHANGES.

The Mining Journal, June 27th, 1908.—Our London contemporary, after due consideration of the Coal Mines Eight Hours Bill, arrives at the conclusion that "the inevitable effect of shortening the hours of work, if the present rate of production is not reduced, must be to accelerate the rate of winding and all other operations underground." In this respect, then, the Eight Hours Bill, if it becomes law, will not improve the Miners' Act. Indeed, it will have a tendency in the opposite direction.

The wild generalizations "of the advocates of the Bill are easily refuted. It is contended by labor members that the death rate among miners is appalling. Statistics prove that as a class colliers are healthier and longer-lived than the average occupied male.

Mr. Walsh, a labor member, threatened that if the Eight Hours Bill were not passed, "trades union methods," which being interpreted means a general strike, would be resorted to.

This is the keynote of the situation. The Journal recognizes the moral certainty of enhanced prices of fuel to consumers, and alludes also to the highly probable increase in wages.

The Mining and Metallurgical Journal (Denver), July 3rd., 1908.—A strong editorial in this number outlines the education that should be acquired by the mining engineer. "The way of the engineering student is hard. A long school and college period is unavoidable; a hard course is his lot in college; his training cannot be confined to books and laboratories, for he must learn many things—such as etiquette and dealings with men—not taught in any schools, but in the walks of life."

Our contemporary predicts that the requirements of modern technical education will lengthen college courses to five and even six years.

PERSONAL AND GENERAL.

Mr. Alex. Gray, of Montreal, passed through Toronto on the 21st July after spending some time in Cobalt.

Dr. T. L. Walker, of Toronto University, is in the Lake of the Wods district searching for rare minerals.

Mr. Frank Loring recently examined and reported upon a deposit of gold-bearing mispickel in the Sudbury region.

Mr. W. F. Jennison, of Sydney, C. B., has been instructed by the Federal Department of Mines to prepare a monograph on the gypsum deposits of the maritime provinces.

Dr. Ells of the Geological Survey has been granted leave of absence on salary to go to Glasgow where he will witness experiments on a shipment of New Brunswick bituminous shale.

Mr. George J. Ross has resigned his position with the Acadia Coal Company of Stellarton, N. S., to become manager and resident engineer of the Lake Copper Mining Company at Copper Lake, N. S.

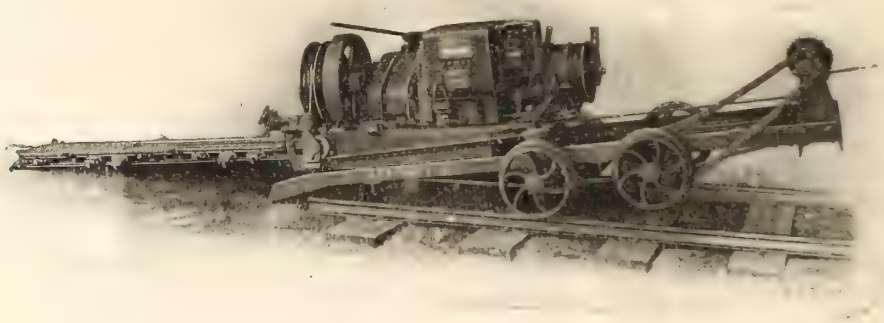
Mr. Frank J. Nicolas, late editor of the publications of the Geological Survey of Canada, has opened an indexing, cataloging and compiling bureau in Ottawa. Mr. Nicolas' work in compiling the general index for the Survey is evidence of his exceptional aptitude for this work.

INDUSTRIAL SECTION.

THE JEFFREY SHORTWALL COAL CUTTER.

For Room and Pillar Work.

The economy and speed with which coal is mined by longwall machines has given rise to a very large demand for an efficient machine operating on the longwall plan, for room and pillar work. Special interest therefore attaches to an announcement that the Jeffrey Manufacturing Company has added to its line of electric coal cutters, a new room and pillar machine, known as the Jeffrey Shortwall Coal Cutter, 26-B., illustrations of which are here shown.



View of Jeffrey Shortwall Coal Cutter being loaded onto truck by its own power.

The difference betwen this and the well-known breast machines built by that company, is largely in the method of cutting. The new type cuts across the face of the coal, starting at one side of the room and not stopping until it finishes the cut at the other side.

A ½-inch steel feed cable wound upon a power driven drum at the front end of the machine pulls it across the face of the coal at a speed dependent upon, and suited to, the hardness of the cutting and the nature of the coal or clay in which the cutting is done. This drum when desired can be disengaged by means of a suitable clutch, so that the machine in finishing its cut at the left hand rib may be angled for the purpose of maintaining a uniform width of room. Another cable, having no connection whatever with the power, is arranged to act as a guide to hold the machine to its work at the proper angle for its greatest cutting efficiency.

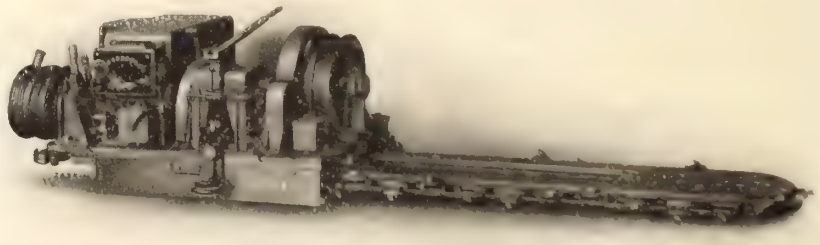
Suitable sheave whels are provided at convenient points on the machine to guide the feed cable so that it can be led off in any direction, thereby enabling the machine to be loaded, unloaded, moved about and pulled out from under the coal by its own power,—a very desirable feature, and one which very strongly appeals to the machine runners.

The gearing is arranged so that the feed drum may be operated at a sufficiently high speed to move the machine quickly about the working place.

To take care of the heaviest service, an exceptionally powerful compound wound motor is provided.

The operation of the machine may be briefly described as follows: It is brought into the room on a truck moved by its own power or hauled by a mule, depending on whether or not a self-propelling truck is used.

A pipe jack is placed at the face of the coal at the right hand rib and the feed cable attached. The motor is then started and the machine moved to the face of the coal. A simple guiding device, consisting of a piece of tee rail and one jack, is then set up on the left-hand side of the machine and the sumping cut started, the feed cable pulling the cutting frame in under the coal and the guiding device serving to hold the machine in line.



View of Jeffrey Shortwall Coal Cutter from control side.

When the sumping cut is completed, a steel anchor hook is secured by a wedge in the left hand rib near the face, to which are hooked one end of both the guide and the feed cables which lead across the face of

the coal. The cable is then attached to a jack set up at the right hand rib in line with the rear drums, and the machine started across the room. In operation, the feed cable pulls the machine across the coal face, and the guide cable keeps it at the proper angle to the face of the coal.

A special flexible brand of wire with elliptic stranding is used for the feed and guide cables, eliminating any tendency to kink or curl up when the tension is released, and materially increasing the wearing surfaces of the cable. The elasticity of the cables equalizes the shocks and jars on the machine and gives the motor an even, steady load.

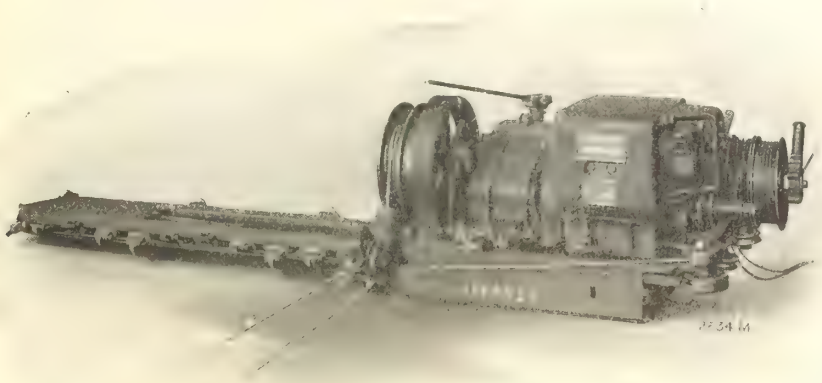
When the machine reaches the left-hand rib, the pipe jack is moved to a position near the truck, the feed cable attached, the machine pulled out from under the coal and over to the truck where it is loaded by its own power and is ready to move to the next working place.

Among the advantages claimed by the Jeffrey Manufacturing Company for this, over any other make of side cutting machine, are:

1st. Its construction is simpler and stronger throughout, and the power of its motor equipment greater, qualifying it to perform longer and harder service and greatly reducing the danger of breakdown and the cost of up-keep.

2nd. It cuts faster, and less time is consumed preliminary to starting up and in removing the machine after the cut is finished.

3rd. It occupies less space and permits setting the props nearer to the face of the coal.



Jeffrey Shortwall Coal Cutter in position for cutting along face of coal. Note arrangement of feed and guide cables.

4th. It consumes substantially less power per cubic inch of coal cut.

5th. It is handled by its own power more rapidly and with less exertion on the part of the machine runners.

In addition to the 26-B. machine illustrated, the Jeffrey Manufacturing Company also builds a side cutter for thin vein coal, the construction and operation of which is essentially the same, no advantageous features being sacrificed to obtain the reduced height.



The Jeffrey Shortwall Room and Pillar Machine cutting across face of coal from right to left.

Both machines cut directly on the floor of the seam.

The motors furnished with these machines are of the most modern and improved types. The frames are made of cast steel with laminated pole pieces. The armatures are drum wound with form wound coils. The field coils are series wound impregnated with insulat-



Jeffrey Shortwall Coal Cutter beginning first or sumping cut at right hand rib.

ing compound and enclosed in oil and moisture proof covers. The commutator bars are of the best quality of hard drawn copper, and are insulated with mica of the proper hardness to insure even wear and long life.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

The Dominion Coal Company's output for the first half of July is about 175,000 tons, which considering that the period includes Dominion Day and the "glorious twelfth," is very good indeed. The outputs are maintaining a steady average of over 14,000 tons a day, and have on several occasions approached the 16,000 mark.

At No. 6 Colliery the work on the new haulage engine is well advanced. This engine is intended to meet the haulage requirements of No. 6 for a good many years. It is a powerful engine, cylinders 26 inches by 48 inches, set on a concrete foundation containing 300 cubic feet of material.

The Walker fan is erected. This fan will have an air capacity of 300,000 cubic feet per minute, and will be more than ample for No. 6 requirements. It is in keeping with the generally heavy and durable class of construction that has been carried on at No. 6 Colliery.

At No. 12 things are moving. The railway will be through and in operation at the end of August. The concrete pedestals for the bankhead are well under way, as is also the construction work on the permanent reservoir. The machine shop, wash-house, warehouse and several other buildings are near completion. The lamphouse is finished and equipped with 120 Ackroyd & Best safety lamps, which will be used in the mine after the 1st of August. The deeps are sunk about 1,350 feet.

At No. 14 the slope sinking is proceeding but is not being pushed. The dip is somewhat steep at the mouth of the slopes, but it is expected to flatten out rapidly as the sinking proceeds. The temporary plant is in course of erection.

The Department of Marine & Fisheries are making improvements in the navigation aids along the Cape Breton coast. They have just installed an acetylene buoy, with whistle and occulting light, in the fairway of Sydney Harbor, and it is understood they will replace the present Low Point Light, which has been in service seventy years, by a modern light, which with its buildings will cost about $16,000. A new fog horn is also being installed at Cape North. It is being built on a ledge of the cape and will have a sheer cliff, over 1,000 feet high behind it, so that the sound should be well projected to sea. During the summer months the waters between Montreal and Sydney are traversed by an endless procession of coal boats, going and coming, and as there is a good deal of fog along the route every aid to navigation is welcomed.

ONTARIO.

Cobalt.

At a meeting of the local branch of the Canadian Mining Institute held at Cobalt on July 17th, a very interesting paper on the origin of the silver in the Montreal River district was read by Dr. A. E. Barlow. Dr. Barlow stated that while he did not make the claim that the development of the James Township area would prove the existence of another Cobalt, yet he believed that the north country would show up a second and possibly a third Cobalt. Dr. Barlow was enthusiastic regarding the future of this new territory and his paper was greatly encouraging to the prospectors who are developing this district. An interesting discussion on the Mines Act was precipitated by a paper read by J. Lorne McDougall, Jr., on the application of the Mines Act. It was proposed that a meeting of the Cobalt branch of the Institute be called for the express purpose of discussing this very important question.

Temiskaming & Hudson's Bay Mine.—On July 14th, the T. & H. B. Mining Company declared a dividend of $6 per share, making a total of $107 per share distributed to the shareholders of this company to date on a par value of $1. This is the eleventh dividend paid by this company and the second paid this year.

Crown Reserve Mining Company.—The foundations for the power plant at this mine has been completed and the boiler and machinery is being installed. The working shaft, which is sunk on the vein, is down 160 feet. A station will be cut at this level and a drift run to the big vein.

The Cobalt Silver Queen Mining Company.—The fire which destroyed the power house at this mine on the morning of July 12th, will not materially affect the operation of the mine. The new 12-drill compressor was, with the exception of one cylinder head and the bearings practically uninjured, the boilers which are bricked in were not damaged. The principal loss will be the building, the repairs to the stack and hoist and the replacing of the lighting plant. The superintendent, Mr. Robert A. Bryce, has the construction of the new power house well under way, and has arranged with the Cleveland Cobalt for air supply until the plant is repaired. A pipe line has been laid from the Cleveland Cobalt and three drills are running at the mine.

Montreal River District.

The diabase area extending south of Silver Lake, through Thompson and Boland Lakes to Hubert Lake, a distance of about seven miles, and the territory surrounding Silver Lake includes some of the most promising prospects in the Montreal River district. A large majority of the claims in this belt upon which any real prospecting has been done, have one or more discoveries of native silver. In the southeast portion of this area adjoining Silver Lake, the Downey claim T. R. 386 has an aplite vein six to eight inches wide which carries high values in native silver and compares favorably in value with the rich bearing veins in the Cobalt camp. This property is tied up in litigation and very little development work has been done. Twenty odd claims to the east of Silver Lake have native silver discoveries of more or less importance, and new discoveries are continually being made.

South of the lake on two claims belonging to Bernard Micmac, good discoveries have recently been made. Cornering on one of these claims and west of Silver Lake is T. R. 224, belonging to Sam Otisse, probably one of the most valuable claims in the Montreal River district. While no sinking and practically no trenching has been done, six important leads showing high values in native silver, have been located. As in the majority of the veins showing native silver in this section of the camp these veins are calcite or aplite, in most cases decomposed on the surface, in which the silver is found freed and lying in a black muck. All of these veins run east and west and average three to four inches in width. The latest discovery on this property made some weeks ago is a vein or dyke of gabbro thirty inches wide, on each side of which is a narrow vein of decomposed calcite one to two inches in width. In these small veins are found nuggets of very pure, white silver and the gabbro is heavily shot with leaf silver. This vein has been uncovered for seventy feet, and wherever opened up shows native silver. It is reported that this property has recently been sold to an English syndicate for a very large sum.

On the five claims belonging to the Clinton & Steindler Syndicate lying west of Silver Lake, a considerable amount of prospecting has been done with very encouraging results. On J. S. 174 a vein of aplite and galena, which assays 37½ per cent. lead and carries small silver values, is being developed. Four out of five of these claims have native silver showings in calcite, cobalt or aplite veins, and with further development, which is now being carried on, these properties should show up well and rank among the best properties in the district.

North of the Clinton & Steindler properties separated by several claims which have not been prospected are the Thompson and Boland properties which include the seven claims in the immediate vicinity of Thompson and Boland Lakes. All of these claims have good discoveries and nine veins have been located which show native silver. North of these claims between Boland Lake and Hubert Lake, the Fisher, Conley and Fraser properties are situated on all of which promising discoveries have been made. In the vicinity of Hubert Lake Otisse has native silver in three veins and several strong leads of smaltite and niccolite. The Doctor Hentchell, and the Currey properties near Hubert Lake, upon which a considerable work has been done, rank with the best properties in the district.

The chief drawback in the development of this section is the difficulty in obtaining funds for prospecting. There is every reason to believe that with proper attention this section will prove up some shipping mines.

ALBERTA.

Strathcona.

What will eventually be one of the largest coal mines in this district has just started sinking operations along side the Edmonton Yukon & Pacific Railway, which connects Edmonton and Strathcona.

The company operating on the property is the Twin City Coal Company with head offices in Toronto. A. Arthur Laurie of Toronto, is president of the company. It has been decided to put down a plant for handling 500 tons of coal per day. Coal cutting machines of the most modern type driven by compressed air, wil be introduced. The seam of coal to be mined is seven-foot cheek, lying about 120 feet below the surface.

District No. 18 of the United Mine Workers of America have decided to appeal to the Supreme Court of Alberta against the decision of Judge Stuart in dismissing the action for $12,000 damages entered by the U. M. W. of A. against the Strathcona Coal Company for a violation of their agreement made under the provisions of the Lemieux Act.

The appeal will be entered on the ground that section 62 of the Lemieux Act provides for the enforcement of an agreement made under that Act, and also that a miner's union has a right to make an agreement collectively and have therefore the right to sue collectively.

The decision to appeal this case was the result of a meeting of the officers of District No. 18 of the United Mine Workers of America, and the various solicitors of that organization held in Calgary recently.

Mr. Frank H. Sherman, President District No. 18, U. M. W. of A., when interviewed in Edmonton on Judge Stuart's decision, said: "We are surprised at the decision given by Judge Stuart. We believed in the Lemieux Act and were under the impression that Judge Stuart believed in it too. Under that Act, Judge Stuart has four times been chairman of conciliation boards in Alberta.

"Last fall he was chairman of a conciliation board held under the Lemieux Act at Lethbridge. He was on the bench then, and upheld on that as on the other occasions, agreements made under the Act he now finds against, as far as the Strathcona agreement was concerned.

"The judge states now that the men have no right to make an agreement collectively, but the union belives that the Strathcona agreement is the same as those made in the South and that the Lemieux Act is still good.

"The two important sections on which we depend are Nos. 24 and 62. The former says: 'If a settlement of the dispute is arrived at by the parties during the course of its reference to the board, a memorandum of the settlement shall be drawn up by the parties and shall, if the parties so agree, be binding as if made a recommendation by the board under section 63 of this Act, and a copy thereof together with a report of the proceedings shall be forwarded to the Minister.'

"That section provides for the two parties coming to an agreement without waiting for the board's recommendation

Section 62 governs the recommendation of the board. Here it is: 'Either party to a dispute which may be referred under this Act to the board, may agree in writing at any time, before or after the board has made its report and recommendation, to be bound by the recommendation of the board in the same manner as parties are bound upon an award made pursuant to a reference to arbitration on the order of a Court of Record; every agreement so to be found made by one party, shall be forwarded to the registrar, who shall communicate it to the other party, and if the other party agrees in like manner to be bound by the recommendation of the board, then the recommendation shall be made a rule of the said court on the application of either party, and shall be enforceable in like manner.'

"We believe in the Lemieux Act," repeated Mr. Sherman, "we know it is a power for good where it is a power at all. It makes for peace and good understanding between employers and employed, and we believe those two sections are good law in the Strathcona case and all over Alberta. Anyway we are appealing and will try to get the Act upheld."

BRITISH COLUMBIA.

Rossland.

During the week ending June 20th, 4,685 tons of ore were sent out from Rossland camp, included in this was a car of hand picked galena ore shipped from the Mayflower. This ore was selected with due care and will return the lessees in the neighborhood of $1,000 for the car. The men now working the Mayflower have another car of ore about ready to ship. The extraction of good ore still continues on the Blue Bird.

The shipments of ore from Rossland for the week ended July 2nd, were 5,405 tons; a little heavier than they have been running lately. The Centre Star shipped 3,550; Le Roi 1,470 and the Josie 385 tons.

Considerable interest is being taken in the anticipated visit of the Canadian Mining Institute and their guests and friends to this camp and the surrounding district in September. A meeting of the Western Branch of the C. M. I. was held here recently and arrangements were discussed for the entertainment of this distinguished party. A committee of prominent mining men was appointed to arrange a programme and there is no doubt but this party will enjoy the usual hospitality that is extended to visitors to this section of the country.

The gross value of the output of the Consolidated Mining & Smelting Company of Canada, of Rossland, also operating in Moyie, Phoenix and at Trail, for nine months of the current fiscal year, which ended June 30th, was $4,178,786, which is $100,000 more than for the entire fiscal year of 1907. It is needless to say that the Consolidated Company's report for the year will show a favorable season of operation.

Boundary.

Work is now being energetically prosecuted on four of the Dominion Copper Company's mining properties in this district, the Rawhide, Sunset and Idaho being operated. The large furnace at the Boundary Falls smelter has been put into operation. This machine has a capacity of 650 tons of ore per day and the two smaller ones, which will be blown in just as soon as conditions at the smelter warrant, have a combined capacity of 600 tons.

Mr. W. C. Thomas has returned to the Boundary from Salt Lake City to make a final arrangement of affairs here, as he has resigned as manager of the Dominion Copper Company to take charge on a Newhouse property in Utah,and will be succeeded by Mr. P. F. Roosa, formerly assistant manager. There being a good supply of coke on hand at the smelter, plenty of water, the ore bins full and the stopes in the mines filled with broken ore, conditions were very favorable for a prompt resumption of work at the Dominion Copper Company's properties. The Dominion Copper Company properties appear on the shipping list during the week ending July 2nd for the first time in a long while. The following were the ore shipments for that week:

	Tons.
Granby	20,522
Mother Lode (B. C. C.)	5,840
Oro Denoro	1,190
Rawhide (D. C. Co.)	11,500
Brooklyn (D. C. Co.)	104
Sunset (D. C. Co.)	450
Mountain Rose	45
Total	29,751

The weekly shipments from this district are beginning to exhibit some of their old time weightiness. The total tonnage sent out for the year is 599,768 tons.

Jay P. Graves, general manager of the Granby, paid his properties a visit about a week ago and expressed himself as very well pleased with the way things had been done around the workings. The improvements, which have cost over $500,000, were all in line with his approval and will mean a material reduction in the cost of production of ore and copper matte. The company is realizing a profit, but it is necessary under the circumstances to utilize every possible improvement and money-saving device in order to secure such a profit.

The British Columbia Copper Company has got down to hard work and are turning out about a car of blister copper per day from the convertors at the smelter. They expect to increase their output materially in the near future. The statement following, which gives the operations of the British Columbia Copper Company smelter during the fiscal year ended November 30th, 1907, will give one a reasonable idea of the work done:

	Pro.	Realized.
Refined copper (pounds)	8,643,133	$1,579,907
Silver (ounces)	101,114	67,274
Gold (ounces)	24,967	512,233
Total		$2,159,414

They received an average of 17.52 cents per pound for their copper.

The British Columbia Copper Company is receiving ore at its smelter regularly from the Napoleon and Lone Star mines, controlled by them and situate in the State of Washington, but they have not begun shipments from their holdings near Danville, Wash., so far.

Mining is quite active in the vicinity of Grand Forks and Nelson on the smaller properties. More work is being done in a development way this year than has been done for some years past. This is no doubt in view of the improved condition of the market for small but meritorious mining properties, which is quite noticeable here in the west.

On the C. P. R. Claim in Franklin camp recently an assay was obtained from rock in the bottom of a 20 foot shaft which gave returns of: $380 in gold, $15 in copper and some silver

A ledge has been located near Nelson carrying native and ruby silver. Ore found on the Mayflower and Hilltop, Sheep Creek district, carries 16 ounces gold, 64 ounces silver and 7 per cent. copper. The Sheep Creek country is presenting a very lively appearance this season and is slowly forging to the front.

GENERAL MINING NEWS.

PRINCE EDWARD ISLAND.

Charlottetown.—An appropriation of $35,000 has been made by the Dominion Government, most of which is to be spent in boring for coal in this province. The discovery of merchantable coal would be of immense benefit to the island.

ONTARIO.

Ottawa.—The following is the text of the lead bounty extension bill:

An Act respecting the payment of bounties on lead contained in lead-bearing ores mined in Canada.

Whereas under the provisions of an Act passed on the 24th day of October, 1903, being chapter 31 of the Acts of 1903, payment of a bounty on lead contained in lead-bearing ores mined in Canada, not to exceed five hundred thousand dollars in any fiscal year, was authorized to be paid until the thirtieth day of June, 1908; and whereas the total amount of bounty paid thereunder up to the thirty-first day of March, 1908, was six hundred and sixty-six thousand nine hundred and twenty-two dollars, and it is estimated that a further amount of forty-five thousand dollars will be payable on or before the thirtieth day of June, 1908, leaving unexpended about one million seven hundred and eighty-eight thousand and seventy-eight dollars of the total amount authorized to be paid under the provisions of the said chapter 31: Therefore His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:

1. The Governor in Council may authorize the payment of a bounty of seventy-five cents per one hundred pounds of lead contained in lead-bearing ores mined in Canada, on and after the first day of July, 1908, such bounty to be paid to the producer or vendor of such ores: Provided that when it appears to the satisfaction of the Minister charged with the administration of this Act that the standard price of pig lead in London, England, exceeds fourteen pounds ten shillings sterling per ton of two thousand and forty pounds, such bounty shall be reduced by the amount of such excess.

The total amount of bounty payable under the provisions of chapter 31 of the Acts of 1903, and of this Act, shall not exceed two million five hundred thousand dollars.

2. Payment of the said bounty may be made from time to time to the extent of sixty per cent. upon smelter returns showing that the ore has been delivered for smelting at a smelter in Canada. The remaining forty per cent. may be paid at the close of the fiscal year, upon evidence that all such ore has been smelted in Canada.

3. If at any time it appears to the satisfaction of the Governor in Council that the charges for transportation and treatment of lead ores in Canada are excessive, or that there is any discrimination which prevents the smelting of such ores in Canada on fair and reasonable terms, the Governor in Council may authorize the payment of bounty, at such reduced rates as he deems just, on the lead contained in such ores mined in Canada and exported for treatment abroad.

4. If at any time it appears to the satisfaction of the Governor in Council that products of lead are manufactured in Canada direct from lead ores mined in Canada without the intervention of the smelting process, the Governor in Council may make such provision as he deems equitable to extend the benefits of this Act to the producers of such ores.

5. The bounties payable under the provisions of this Act shall cease and determine on the thirtieth day of June, one thousand, nine hundred and thirteen.

6. The Governor in Council may make regulations for carrying out the intention of this Act.

Sault Ste. Marie.—The Lepage Gold Mining Company, which is operating the Grace Mine at Michipicoten, held its annual meeting of stockholders at Minneapolis recently, when a new board of directors was elected. The members of the board are: President Dr. D. A. Stewart, Winona, Minn.; M. B. Webber, Winona, Minn.; L. S. Peek, Minneapolis; J. H. Foster, Minneapolis; A. B. Robbins, Elroy, Wis.; N. C. Eklund, Basa, Minn. Mr. Angus Gibson was reappointed general manager of the company, and Mr. Roy Earle will continue as superintendent at the mine. Ten stamps are to be added to the present mill.

Madoc.—The talc-grinding mill is now in operation. An output of from 10 to 12 tons of various grades of ground talc per day is expected. This is an important addition to Madoc's activities.

Cobalt.—The power plant of the Silver Queen was burned to the ground on Sunday morning, July 12. Repairs to the machinery are being rushed with all possible speed. Meanwhile a supply of compressed air is arranged for with the Cleveland-Cobalt Company. The damage is estimated at $5,000, fully covered by insurance.

BRITISH COLUMBIA.

Nelson.—Mr. John L. Retallack, who did excellent work in connection with securing an extension of the lead bounty, has succeeded in organizing a company to take over the Whitewater Deep property.

Rossland.—At the St. Eugene mine at Moyie, several discoveries have been made lately. An extension of the south ledge has been found and it is expected that the ore bodies of the mine will be largely increased thereby.

Nelson.—The Kootenay Development Company has taken a lease on the Silver King mine and Hall Mines smelter, and is erecting a pole line to electrify the property, and will unwater by that means levels to depth of 800 feet. This will mean the employment of over 100 men on the mine berore Christmas.

Phoenix.—A new and promising ore body has been struck at the Brooklyn mine of the Dominion Copper Company.

Nelson.—After years of litigation, the Last Chance mine, near Sandon, one of the Slocan's principal silver shippers, will be again operated.

Victoria.—Mr. J. T. Shadforth announces that capital for the erection of a steel plant has been secured. The blast furnaces will be situated near one of the Vancouver Island collieries. Beyond this, no definite announcement has been made.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The wages of Northumberland coal miners have been reduced 2½ per cent.

Mr. John Cadman, D. Sc., has been appointed to the chair of Mining at Birmingham University.

The extension of Leeds University including the departments of mining and metallurgy, elaborately equipped, was opened by King Edward on July 7th. The cost was largely met by the Yorkshire coal owners.

The Welsh Navigation Steam Coal Company, who have been sinking in the Eby valley two years, have struck te celebrated No. 3 Rhondda seam of coal at a depth of 1110 feet, proving an area of 3,000 acres of coal.

FRANCE.

Mons. P. Barbier has discovered a new variety of mica at Mesvries, which cannot be classed in the muscovite group, but it is more like paragonite in composition, though it has not the same external characteristics. It is distinguished from muscovite by its percentage of lithia. The discoverer has given it the name of hallerite.

NORWAY.

The Hohenlohe-Werke Company, Oberschlesien, has obtained for one of their subordinate Norwegian companies a concession of extensive zinc claims in Hakedal and Nannestad near Christiania. The concession is for 82 years at the end of which the mines and plant revert to the State. The company will employ from 600 to 700 men.

RUSSIA.

The yield of asbestos in the Ural has steadily increased from 64,654 poods in 1893, to 571,194 poods in 1907. Owing to the increased prices other areas are being prospected. It is stated that recently large and rich deposits of this mineral have been found in the Altay mining district, a concession for the exploitation of which has been granted.

GREECE.

Large exports of magnesite from the Piraeus district to Britain, Germany and America have laterly been made. The Anglo-Greek Magnesite Company has undertaken the sale of the produce of the Greek Societe des Travaux Public et Communeaux, the latter being bound to deliver annually 42,000 tons, to effect which they will open up new deposits and increase their plant.

Two new companies have been floated for working iron ores in the Pireans district, where large deposits occur. It is reported that extensive quantities of rich iron ore also exist near Karditza Baotia, and a company is being organized to operate them.

AUSTRALASIA.

Production at the tin mines of Tasmania was on a much greater scale during the first three months of 1908 than for the corresponding period last year, the figures being 1,045 tons of black tin, as against 586. Some recently located ore bodies of the Mount Bischoff Company are opening up satisfactorily.

The Zinc Corporation at Broken Hill, New South Wales, has been more successful since adopting the Elmore process of concentration, by which 10,810 tons of tailings were treated during April. Costs have been so reduced that a profit can be realized even at present prices.

The output of gold in New Zealand during June amounted to 47,416 ounces, valued at £190,656, as compared with 26,702 ounces valued at £104,456 in June, 1907.

SOUTH AFRICA.

The Transvaal Government has decided to take over a worked or developed mine in conjunction with the Chamber of Mines and utilize it as a training school for skilled miners.

The Robinson Gold Mining Company of Johannesburg made another record in the reduction of working expenses for May last, bringing the costs down to 12s. 4½d. per ton.

The African Diamonds Corporation and the old Driekopjes Company have been merged and work has been resumed on the Driekopjes property.

UNITED STATES.

There are now twelve shipping mines in the Rawhide, Nev., camp and but one mill in operation, which is being enlarged to a capacity of 120 tons per day. The ore treated yields from $30 to $50 per ton. Several other mills will shortly be started.

The Nova Scotia Steel Corporation having nearly completed stripping at the Norman-Ohio iron property at Virginia on the Mesabi range, Mich., preparations are being made for the extensive mining of the tract.

The Beatson copper mine on Latondie Island, Alaska, isre ported to have $10,000,000 worth of copper in sight. The out put from the smelter at Tacoma to 1907 was [illegible] pounds copper and 9,000 of silver. Production is purposely restricted on account of high transportation and smelter charges.

At the Williamston colliery of the Susquehanna Coal Company, in the lower part of the anthracite coal fields of Pennsylvania, seven miners were killed and ten injured by an explosion of gas on July 15th. The mine was wrecked and set on fire.

COMPANY NOTES.

The Crow's Nest Pass Coal Company on July 16th distributed a stock bonus to its shareholders of 66 2-3 per cent. and later on declared a half yearly dividend of 3 per cent., payable August 1st, on the basis of the new stock. This is the same as 10 per cent. on the old stock.

In July the following dividends will have been paid by Cobalt companies:

Nipissing, 3 per cent. quarterly	$180,000
McKinley, 3 per cent. quarterly bonus 2	112,346
Kerr Lake, 2 quar., bonus 1	90,000
Crown Reserve, 4 p.m., ½ year	80,000
Temiskaming, 3 per cent., quar	[illegible]
Hudson Bay, 86	[illegible]
Buffalo, 3 per cent., quar	27,000
City of Cobalt, 3 interim and bonus 2 per cent	25,000
Total	[illegible]

STATISTICS AND RETURNS.

NOVA SCOTIA COAL SHIPMENTS.

Outputs of the Dominion Coal Company, July 1st to 15th, 1908:—

No. 1	25,320
No. 2	31,940
No. 3	18,650
No. 4	19,330
No. 5	23,750
No. 6	10,280
No. 7	8,290
No. 8	11,080
No. 9	15,550
No. 10	8,880
Total	173,070

Cumberland Railway & Coal Company.

Shipments June, 1908	29,411
Shipments June, 1907	34,310
Decrease June, 1908	4,899
Shipments 6 months, 1908	198,279
Shipments 6 months, 1907	176,346
Increase 6 months, 1908	21,933

Inverness Railway & Coal Company—

Shipments June, 1908	30,171
Shipments June, 1907	28,062
Increase June, 1908	2,109
Shipments 6 months, 1908	128,291
Shipments 6 months, 1907	103,037
Increase 6 months, 1908	25,254

Intercolonial Coal Company—

Shipments June, 1908	21,845
Shipments June, 1907	22,374
Decrease June, 1908	471
Shipments 6 months, 1908	134,523
Shipments 6 months, 1907	131,897
Increase 6 months, 1908	2,626

Nova Scotia Steel & Coal Company—

Shipments June, 1908	64,100
Shipments June, 1907	77,055
Decrease June, 1908	12,955
Shipments 6 months, 1908	287,595
Shipments 6 months, 1907	240,682
Increase 6 months, 1908	46,913

Acadia Coal Company

Shipments June, 1908	30,750
Shipments June, 1907	30,639
Increase June, 1908	111
Shipments 6 months, 1908	162,648
Shipments 6 months, 1907	142,894
Increase 6 months, 1908	19,754

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1st to date:

	Week end. July 11. Pounds.	Since Jan. 1. Pounds.
Cobalt Lake	95,228	341,683
La Rose	83,100	2,631,662
Kerr Lake	60,674	522,974
Nipissing	127,007	2,283,747
Nancy Helen	187,007	327,427
O'Brien	191,307	3,412,777
Peterson Lake	41,237	41,237
Silver Queen	180,000	814,510

The total shipments for the week were 965,560 pounds, or 483 tons. The total shipments from January 1st to date are 19,048,813 pounds, of 9,524 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000. In 1904 the camp produced 158 tons, valued at $130,217; in 1905, 2,144 tons, valued at $1,473,196; in 1906, 5,129 tons, valued at $3,900,000.

Shipments of ore from the Cobalt camp for the week ended July 18 totalled 1,011,000 pounds., or 505 tons, a record output, divided among eight mines. Shipments from January 1st to date total 20,059,813 pounds, or 10,003 tons. Mines and shipments were:

	Week end. July 18. Pounds.	Since Jan. 1. Pounds.
Buffalo		696,390
Coniagas		631,890
Cobalt Lake	95,228	341,683
Cobalt Lake		341,683
Crown Reserve	44,000	128,000
*Cobalt Central		210,075
City of Cobalt		615,380
Drummond		188,600
Foster		238,400
Kerr Lake		522,974
King Edward		127,240
La Rose	362,610	2,994,272
McKinley		1,735,280
Nipissing	253,600	1,988,880
Nova Scotia	40,230	311,775
Little Nipising		40,110
Nancy Helen		327,427
O'Brien	63,870	3,476,647
Peterson Lake		41,237
Right of Way	60,050	433,820
Provincial		143,210
Silver Leaf		196,620
Silver Cliff		52,000
Silver Queen		879,310
Townsite		130,700
Temiskaming		545,000
Temis, & H. B.		724,000
Trethewey	121,640	1,491,046
Watts		306,180

*Concentrates.

The output of the Crow's Nest Pass collieries for the week ending July 10th was 22,261 tons, a daily average of 3,710 tons. Week ending July 13th, 1907, 24,015 tons; daily average,

4,002 tons; wek ending July 13, 1906, 18,108 tons; daily average, 3,018 tons.

The gold production of the Transvaal mines last June was officially placed at 574,973 fine ounces. This was a loss of 7,000 ounces from May, but an increase on last Saturday's estimates of 5,000. The value of the month's output was $12,200,000.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, July 11.—The following were the ore shipments from the mines and the receipts at the smelters of the districts of Southeatsern British Columbia for the past week and year to date:

Ore Shipments.

	Week.	Year.
Boundary—		
Granby	17,399	560,744
Mother Lode	8,944	49,114
Oro Denoro	1,980	15,646
Rawhide	1,360	2,860
Brooklyn	1,066	1,170
Sunset	582	1,032
Mountain Rose	60	105
Sally	19	86
Curley	7	7
Other mines	.....	455
Total	31,417	631,219
Rossland—		
Centre Star	2,633	88,102
Le Roi	1,420	41,398
Le Roi No. 2	721	15,820
Other mines	.....	552
Total	4,774	145,872
East of Columbia River—		
St. Engene	424	10,799
Whitewater (miled)	280	7,700
Poorman (mileld)	250	6,100
Queen (milled)	185	4,985
North Star	199	1,627
Fern (milled)	150	350
Blue Bell	129	221
Whitewater	95	707
Richmond	45	1,002
Arlington Erie	22	832
Standard	55	717
Rambler Caribou	22	710
Sunset	21	187
Fern	17	17
Bluebird	15	60
Ottawa	24	24
Other mines	....	15,405
Total	1,933	51,410
Grand Total	38,124	812,996

Smelter Receipts.

Smelter—		
Grand Forks	17,399	560,744
Greenwood	10,924	66,680
Boundary Falls	3,068	5,167
Trail	6,467	145,572
Northport (Le Roi)	1,545	44,615
Marysville	.....	5,730
Total	39,403	828,508

COBALT ORE STATEMENT FOR THE MONTH OF JUNE, 1903.

	Pounds.
O'Brien Mine—	
June 3rd., Am. Smelting Co., Denever, Col.	58,200
June 4th, Deloro M. & R. Co., Deloro, Ont.	54,500
June 6th, Am. Smelting & R. Co., Denver, Col.	84,500
June 10th, Deloro M. & R. Co., Deloro, Ont.	63,300
June 13th, Am. Smelting & R. Co., Denver, Col.	62,100
June 13th, Am. Smelting & R. Co., Denver.	61,500
June 15th, Am. Smelting & R. Co., Denver.	63,900
June 18th, Am. Smelting & R. Co., Denver.	62,600
June 20th, Am. Smelting & R. Co., Denver.	63,320
	573,920
Nipissing Mine—	
June 4th, Nipissing Mine, New York, N. Y.	58,560
June 5th, Nipissing Mine, New York.	49,660
June 15th, Nipissing Mine, New York.	55,200
June 15th, Nipissing Mine, New York.	54,000
June 17th, Nipissing Mine, New York.	63,160
June 19th, Newark, N. J.	67,400
June 24th, Newark, N. J.	62,400
June 27th, Newark, N. J.	61,320
	471,700
La Rose Mines—	
June 3rd, La Rose Mines, Denver Col.	59,960
June 5th, New York, N. Y.	46,620
June 20th, Denver, Col.	64,200
June 20th, Perth Amboy, N. J.	43,800
June 29th, Anglo French Nickel Co., Swansea, Wales.	62,240
June 29th, La Rose Mines, Denver, Col.	[illegible]
	356,820
Buffalo Mines—	
June 4th, Buffalo Mines, Copper Cliff, Ont.	42,900
June 24th, Buffalo Mines, Copper Cliff, Ont.	41,500
	84,400
Grand Total	1,486,840

MARKET REPORTS.

Coke.

July 20.—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt, $1.60.
Foundry coke, prompt, $2.00.

Other Metals.

July 20.—
Tin, Straits, 29.30 cents.
Copper, prime lake, 12.85 to 13 cents.
Lake, arsenical brands, 12.80 cents.
Electrolytic copper, 12.75 to 12.85 cents.
Sheet copper, 17 cents.
Copper wire, 14.75 cents.
Lead, 4.45 cents.
Spelter, 4.45 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.50 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $45 per 75 pound flask.

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Ladysmith	Portland, Ore.	Victoria
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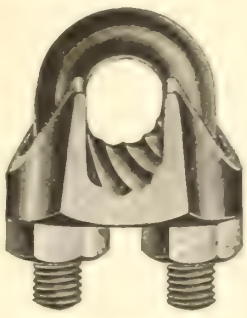
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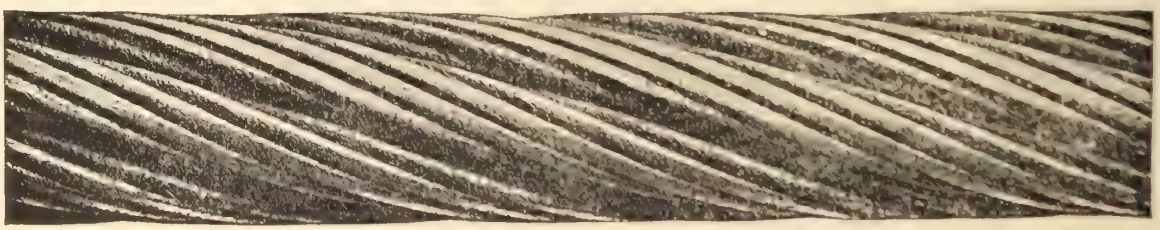


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The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HON. FRANK COCHRANE,
Minister of Lands, Forests and Mines,
Toronto, Canada.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and Europe is invited to the

Mineral Territory Open for Investment in the Province of Quebec

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc. **Ornamental and Structural Materials in abundant variety.** The Mining Law gives absolute security to title and has been specially framed for the encouragement of mining

All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to:

The Hon. Minister of Colonization, Mines and Fisheries
Parliament Buildings, Quebec.

Province of Nova Scotia

Leases for Mines of Gold, Silver Coal, Iron, Copper, Lead, Tin

AND

PRECIOUS STONES

Titles given Direct from the Crown, Royalties, and Rentals Moderate

Copies of the Mining Law and any information can be had on application to

The Hon. Christopher Chisholm

Commissioner Public Works and Mines, - - HALIFAX, NOVA SCOTIA

JUDICIAL SALE

of all Assets of the Copper Mining and Smelting Company of Ontario, Limited in Liquidation.

Sealed tenders will be received, addressed to His Honor F. W. Johnson, Local Master, Sault Ste. Marie, Ontario, and marked "Tenders in THE COPPER MINING AND SMELTING COMPANY of Ontario, Limited, Liquidation," up to twelve o'clock noon on the Fifteenth day of September, 1908, for the purchase of all the assets of the said Company now in the possession and control of the Liquidators, which assets consist of the valuable Mine and Mining Property situated in the Town of Bruce Mines in the District of Algoma and Province of Ontario, on the North shore of Lake Huron (where there is a good harbour and shipping facilities) with machinery, buildings, plant and full equipment situated on the premises, and wharfage, railway tracks and sidings.

Tenders will be received for the entire property or for any of the following parcels:

PARCEL 1

Mine, Mining Rights, Buildings, Machinery, Plant, Concentrating Mill, Railway Track and Sidings, Coal Dock, Skimpings, Slimes and Ore already won. There are two principal working shafts some 500 feet in depth, which have been in full operation until recently. The property consists of all the mineral rights in two grants or locations, embracing an area of some 20 square miles (with the exception of 116 acres already disposed of), also the surface rights of about 665 acres of said lands (of which 300 acres are within the limits of the Town of Bruce Mines).

Bruce Mines Station of the Canadian Pacific Railway, situated on the property, is 135 miles from Sudbury and 37 miles from Sault Ste. Marie. The Bruce Mines and Algoma Railway here crosses and runs down to the Lake, having a station and sidings convenient to the mines.

THE BUILDINGS, adapted to large operations, are in good condition, and consist of machine shop, fully equipped, blacksmith's shop, store houses, oil house and boiler houses, two power houses, mill offices, Manager's and Mill Superintendent's houses, boarding house, ice house, stable and dynamite magazine.

THE MACHINERY AND PLANT, which are in good running order, have an inventory valuation of $96,500.00. The concentrating mill, situated on the Lake front, has a capacity of 250 tons per day and pumping plant of 60,000 gallons per hour. Its construction and equipment cost $130,000.00. The Electric Light plant has a capacity of 500 lights. One and one half miles of Railway Track (with sidings) connect the mine proper with the Concentrating Mill and Coal Dock, where vessels drawing 16 feet can load and unload.

THE SKIMPINGS, estimated at 120,000 tons, are useful for fluxing purposes in nickel smelters, and for the manufacture of artificial stone. A separate tender for these skimpings will be considered. The ore already won and in the stopes is estimated at 9,000 tons. Considerable development work has also been done on the property exposing a large body of ore.

PARCEL 2

TOWN AND PARK LOTS, containing about 300 acres within the town limits, sub-divided into over 100 convenient building lots.

WATER LOTS, situated in front of the Concentrating Mill and adjoining the coal dock.

ISLANDS: "French," "McCoys," "Bruce," "Rat," "Mouse," having in all an estimated area of 75 acres, with some suitable lumber-mill sites.

PARCEL 3

RANGE LOTS, consisting of about 365 acres in the Township of Plummer Additional.

PARCEL 4

WHARF AND WAREHOUSES, conveniently situated adjoining the Government Dock, with 16 feet depth of water.

Tenders for separate lots and islands mentioned in parcels 2 and 3 will be considered.

The principal workings are being kept free of water and will be open for examination by intending purchasers. Full descriptions and particulars of the real estate and full details, inventories, etc., of the plant, machinery and other assets of the Company can be obtained upon application to the Liquidators T. Hayes Sheen, Jnr., at Bruce Mines, Ont., or R. C. Jennings, 18 Toronto Street, Toronto. A full inspection of all the property may be had at any time.

As to the real estate, it is understood that the foregoing description is only a general description and the areas given are only approximate and the purchaser is to satisfy himself as to the quantity of land and the title of the Company thereto and shall search the title at his own expense and the liquidators will not be required to furnish any abstract of title or to produce any title deeds other than those in their possession.

TERMS OF SALE: 10 per cent. cash; 40 per cent. within 30 days, and balance within 60 days with interest at 7 per cent., secured to the satisfaction of the Liquidators. The tenders must be accompanied by a marked cheque, payable to the Liquidators for 10 per cent. of the amount of tender, which will be returned if tender is not accepted.

The highest or any tender not necessarily accepted.

The other conditions of sale are the standing conditions of sale of the Court as far as applicable.

For further particulars and conditions of sale, application may be made to either of the above-named Liquidators or their Solicitors.

DATED at Sault Ste. Marie this Third day of July, A.D., 1908.

F. W. JOHNSON, Local Master.

HEARST, McKAY & DARLING, Sault Ste. Marie, Ont.
Solicitors for Liquidators.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

HON. MINISTER OF MINES

Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.



Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

The Canadian Miner's Buying Directory.

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Before purchasing supplies, machinery or equipment, consult the firms mentioned in this Directory. They are prepared to fill your order with all possible despatch. If requiring anything not listed in these columns, address THE CANADIAN MINING JOURNAL and you will be put in touch with responsible firms. In writing advertisers, kindly mention this Journal.

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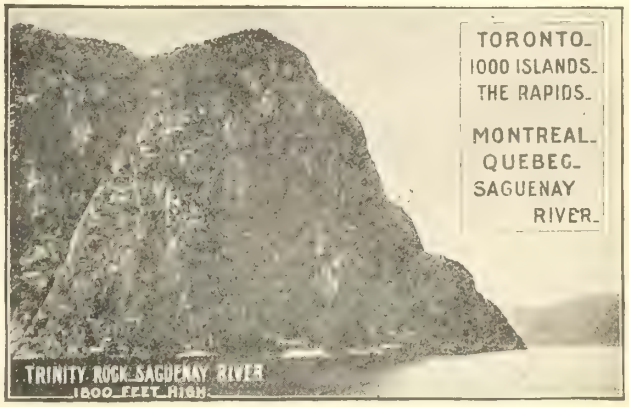
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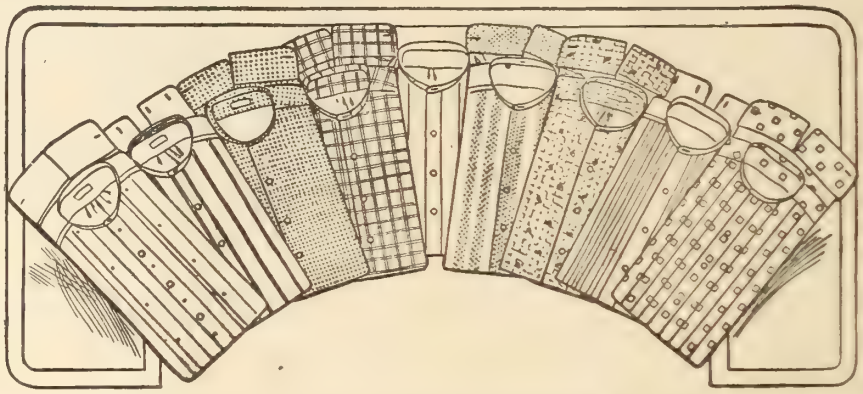
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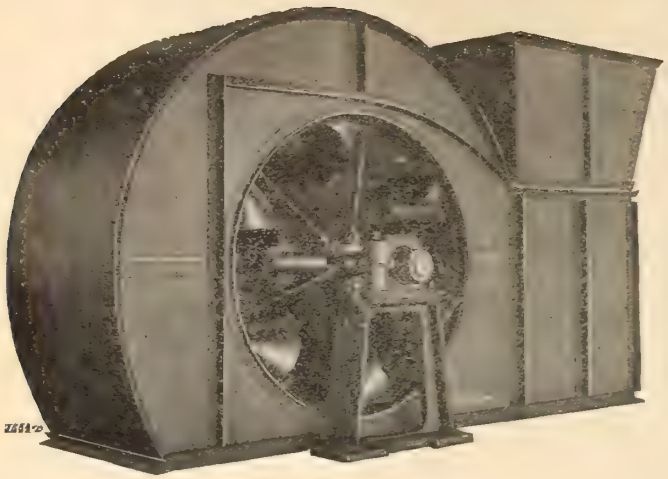
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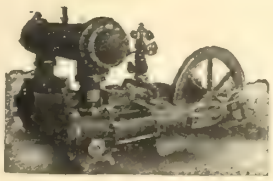
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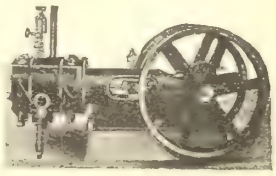
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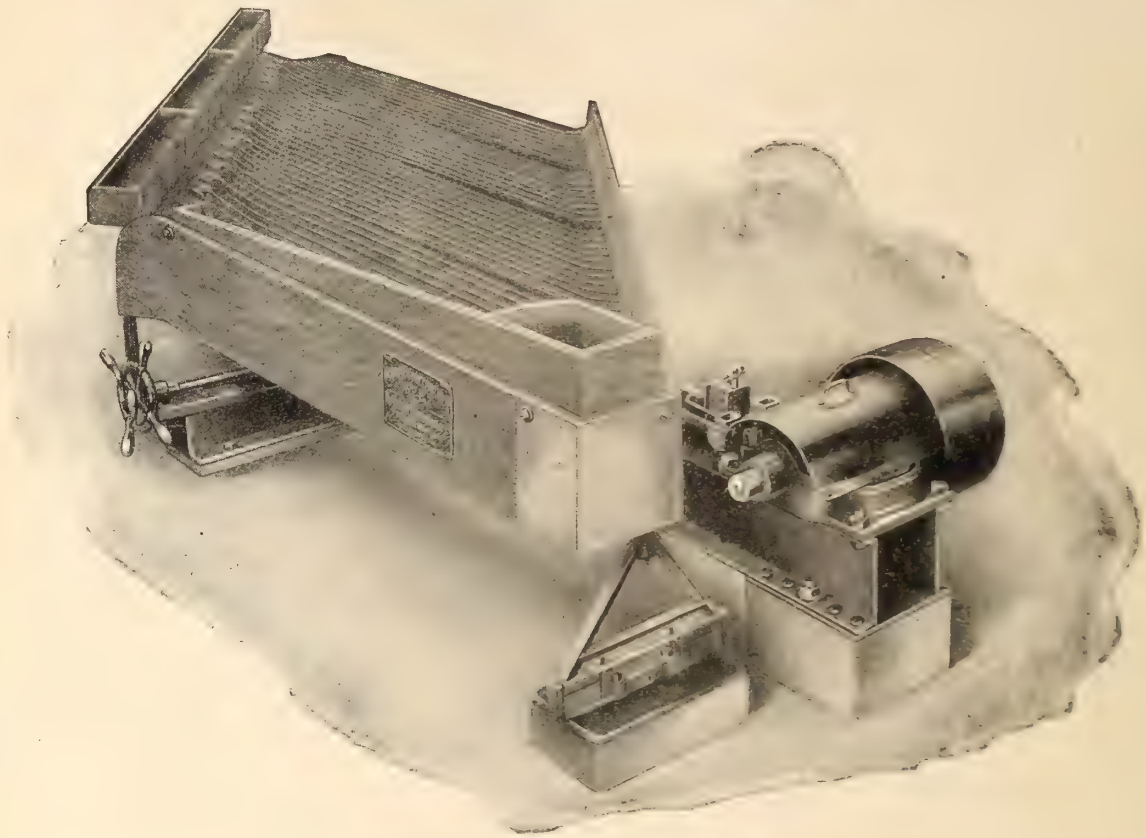
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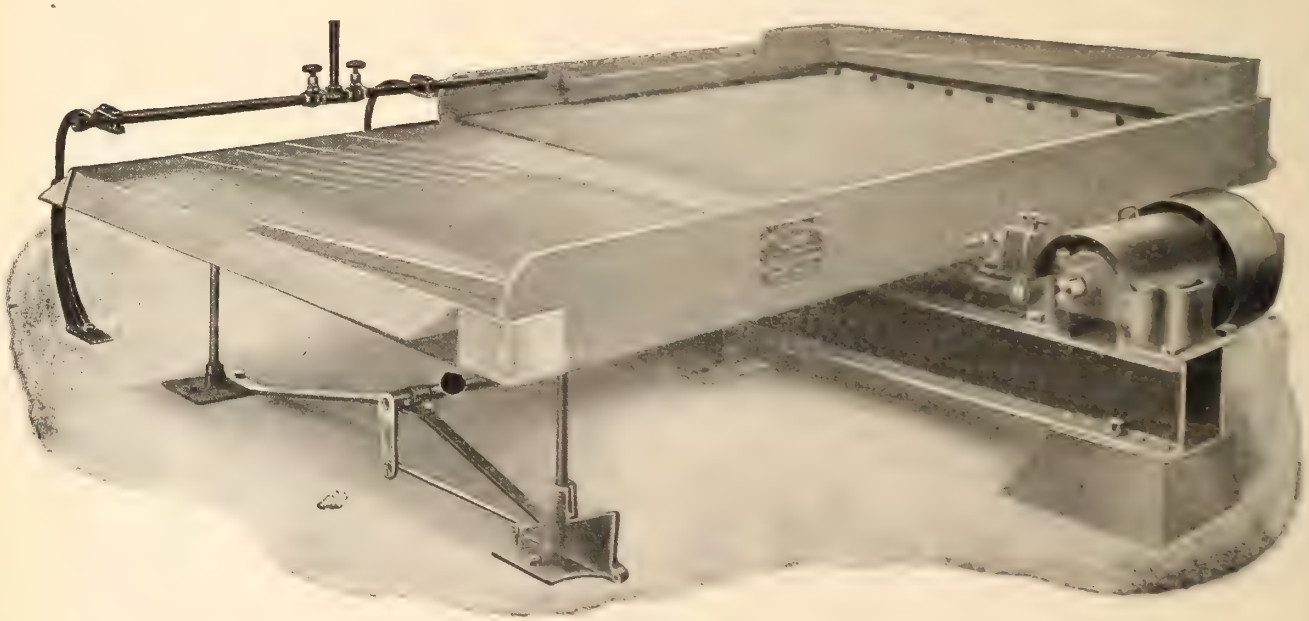
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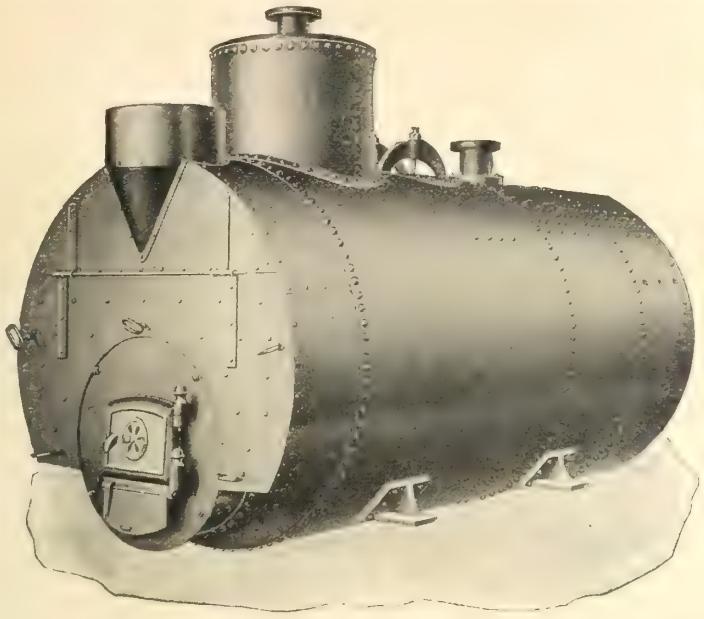


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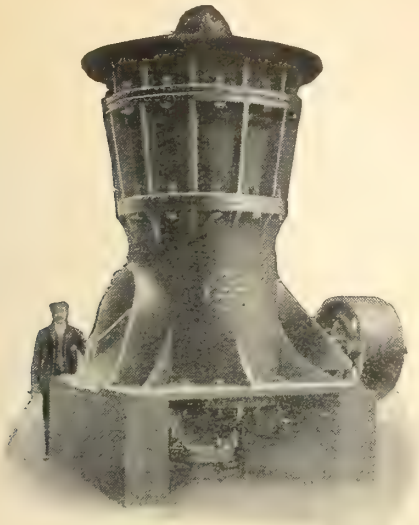
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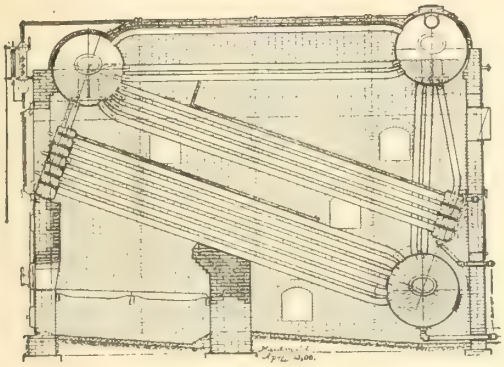
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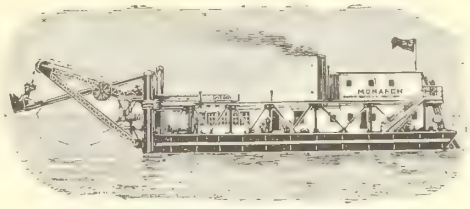
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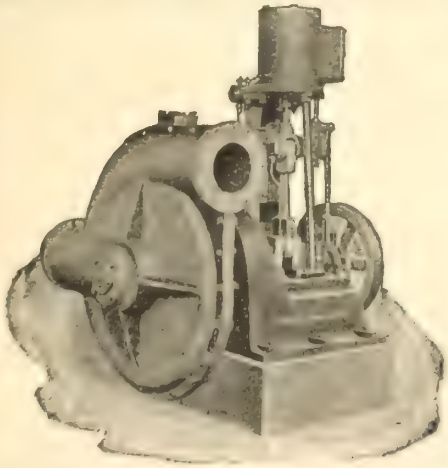
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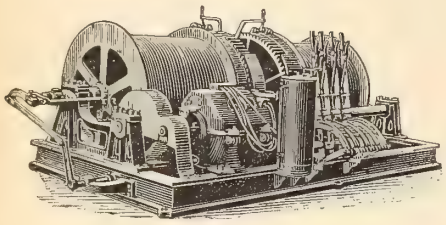
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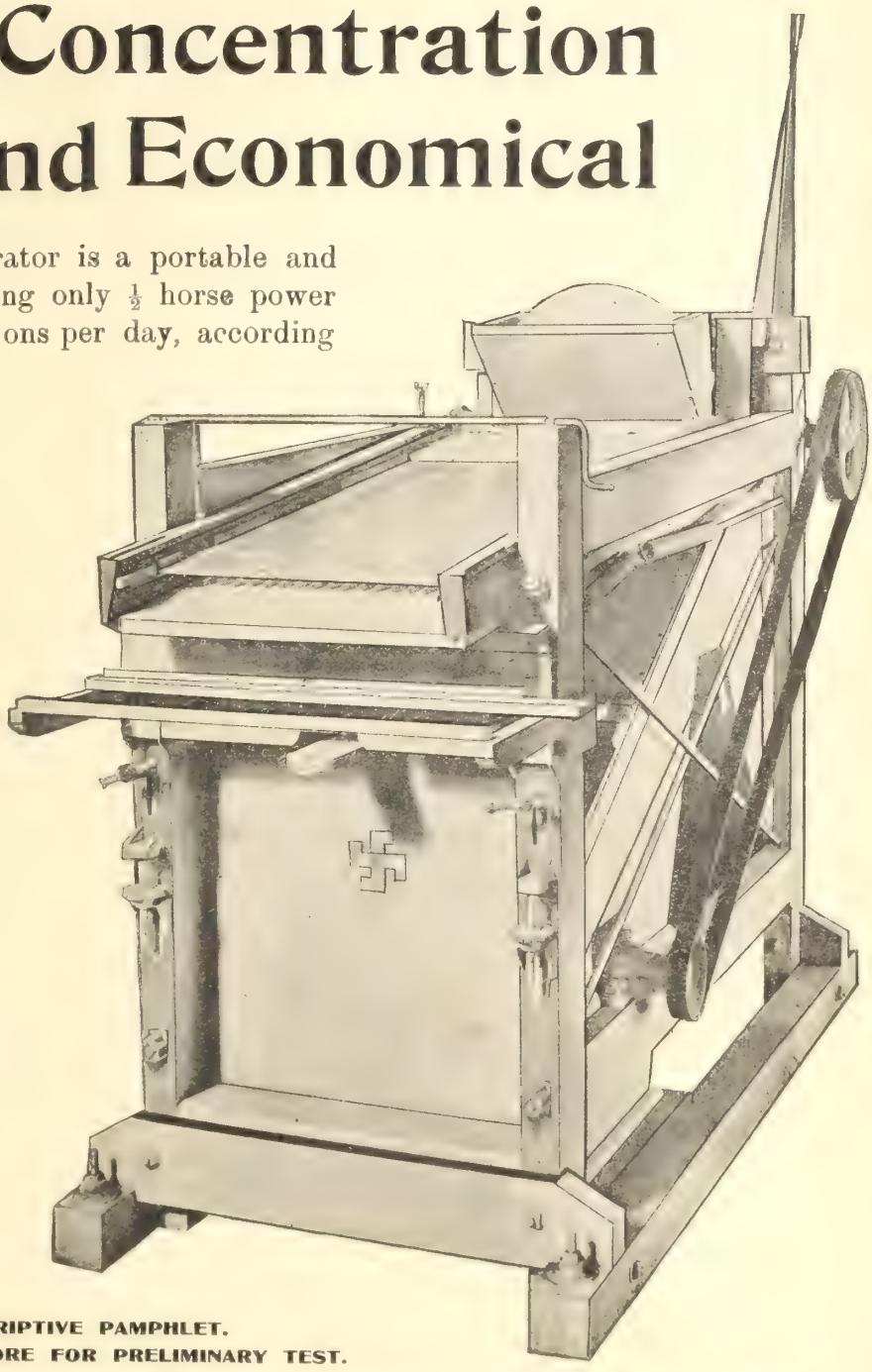
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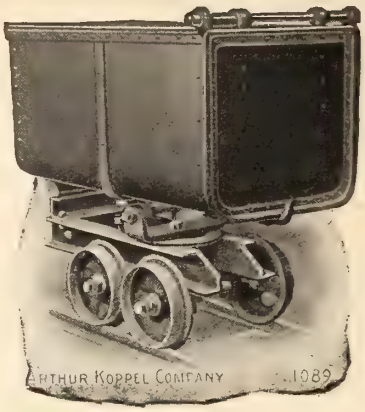
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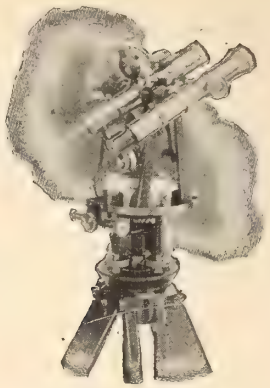
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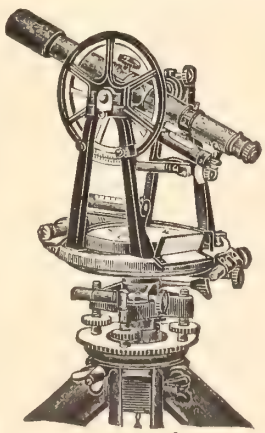
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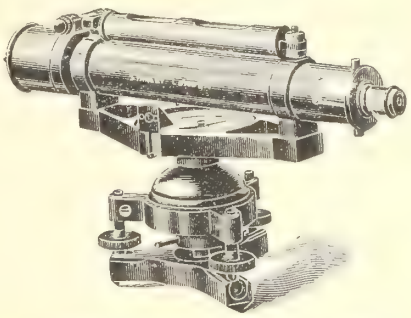
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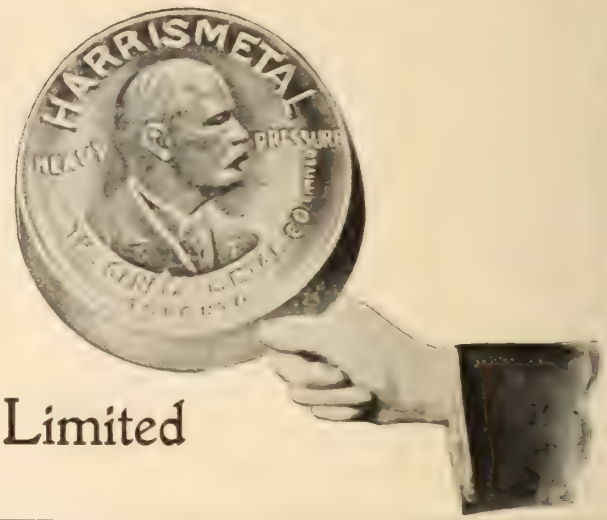
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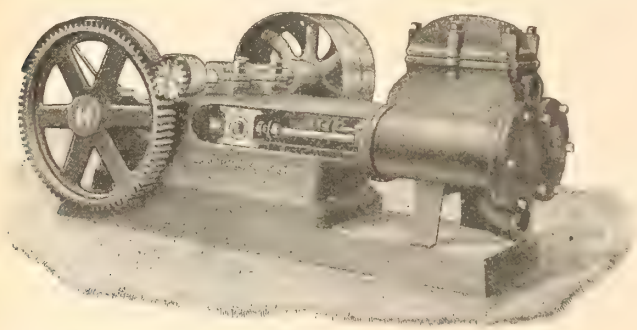
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THE CANADIAN MINING JOURNAL

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LA ROSE CONSOLIDATED MINES COMPANY.

The first annual report of this corporation has recently come to hand. Because of the prominence and importance of La Rose mine itself, if for no other reason, the report deserves more than passing notice.

By intention or through neglect those responsible for the compilation of the document have not complied with several essential requirements of the Ontario Companies Act. There is no excuse for this. It is bad business, and implies defective vision either in the promoters or in their legal advisers, or in both.

As mentioned below there are four directors whose interests in the company is not defined in the report. Subscribers have a legal right to demand full information regarding the holdings of these directors.

Apart from these serious and needless omissions, the report is apparently a sincere attempt to give the public much necessary information.

The publication of the report sets at rest a number of points that have been discussed by the public without official information.

The Consolidated Company controls the following properties: La Rose, La Rose Extension, Princess, Fisher, Eplett, Silver Hill, University Mines and the Violet. All of these properties, with the exception of the Violet, were formerly controlled by La Rose Mines, Limited, which still remains the operating company.

The Consolidated Company has a Maine charter. The capitalization is $7,500,000 in $5 shares. The directors of the company are the five directors of La Rose Mines, Limited, Messrs. John McMartin, L. H. Timmins, N. A. Timmins, D. A. Dunlap and D. McMartin, together with Mr. D. Fasken, of Toronto, and Messrs. E. P. Earle, R. T. Greene, and F. W. Holmes, of New York. Messrs. Earle and Fasken are well known in Canada in connection with the Nipissing mine. The report does not say what interests the four last named directors have in the Consolidated Company, whether they have purchased a part of the La Rose Mines, Limited, or whether they represent the Violet interests, or whether they have been brought into the Consolidated Company owing to their varied experience in connection with the Nipissing mine.

Three reports by mining engineers accompany the general report of the company. The first of these is by Watson & Watson, and is dated June 15, 1908. The senior member of this firm is now resident manager of the Nipissing and is consulting engineer to La Rose Consolidated. The second report is by Mr. T. R. Drummond, recently manager of the Nipissing, and is dated June 1, 1908. The third is by Dr. W. G. Miller, and is dated August 9, 1907. The ore reserves reported

on in all three cases are practically confined to La Rose mine proper, J. S. 14. The most recent report, that by Watson & Watson, shows an estimated profit of $2,017,878, while the net value given by Mr. Drummond is $2,638,950. Dr. Miller's report, made for the original owners a year ago, gives a considerably higher number of ounces; but the net value is indicated only in a general way. For the main vein Watson & Watson give 4,045.4 tons; Mr. Drummond gives 4,957, and Dr. Miller gives 5,966, of which 3,728 tons are above the first level and 2,238 tons below it. Dr. Miller states that the ore averages 765 ounces of silver to the ton on the first level, and he is inclined to allow a higher average value than this for the block of ore lying between the first level and the surface. Analyzing the figures in the reports of Watson & Watson and Mr. Drummond, it is seen that the 4,045.4 tons in the former report contains 2,903,310 ounces of silver, or an average of 717 ounces to the ton; while Mr. Drummond's 4,957 tons contain 3,673,000 or 740 ounces to the ton. It is not so stated, but the 717 and 740 ounces respectively apparently represent the average found for the ore on the first level.

Of the three reports the public will naturally lay more stress on the most recent one as showing what the ore in the mine really represents at the present time. According to Messrs. Watson & Watson this shows an estimated profit of $1,735,712 for practically developed ore and $282,166 for indicated ore, or a grand total of $2,017,878.

The mine has been under development for four years and according to the statement of the president in the report it has earned $1,204,862 net for its owners.

DR. HENRY YOULE HIND.

Dr. Henry Youle Hind, explorer, geologist, journalist and educationist, died at Windsor, Nova Scotia, on Sunday, August 9th.

Born at Nottingham, England, on June 1, 1823, he received his early training at a local grammar school. After two years in Leipsic he studied for some time at Cambridge. In 1846 he came to Canada and accepted the appointment of instructor in mathematics and chemistry in the Provincial Normal School, Toronto. Five years later he became professor of chemistry and geology in Trinity University. This chair he occupied for thirteen years.

In 1857 the Canadian Government requested Professor Hind to accompany, in the capacity of geologist, an exploring party sent to the Red River. In the succeeding year he was placed in charge of a similar expedition to the Assiniboine and Saskatchewan regions. The published reports of his travels contained the first map of that great and fertile country.

Again, under the direction of the Canadian authorities, Professor Hind explored the shores of James and Hudson Bays, and, to a limited extent, the interior of the Labrador peninsula. Much of this was pioneer work of the most difficult and trying nature.

Resigning the chair of geology and chemistry in 1864, Professor Hind undertook a preliminary geological survey of New Brunswick at the request of the Government of that province. After completing this task in 1866, he came to Windsor, Nova Scotia, where he resided until his death.

In the year last mentioned, 1866, the excitement induced by the discovery of gold in Nova Scotia was at its height and Professor Hind was engaged by the Provincial Government to examine and report upon the gold districts of the province. Ten years later he explored northeastern Newfoundland and the Atlantic coast of Labrador, investigating not only the mineral resources of these regions, but also the fisheries and other natural resources.

When, in accordance with the provisions of the Treaty of Washington, the Fisheries Commission met in Halifax in 1876, Professor Hind played an important part in the deliberations. Later, his invaluable work in charting the movements of fish in North American waters won for him a gold medal from the directors of the Paris Exhibition.

In addition to his other activities Dr. Hind was from 1852-1855 editor of the Canada Journal, the official organ of the Canadian Institute. For a time, also, he edited the British American Magazine and the Journal of the Board of Arts and Manufactures of Upper Canada.

Trinity College, in 1853, conferred upon him the degree of M.A., and in 1890 King's College, Windsor, granted him the degree of D.C.L.

During later years much of Dr. Hind's time and energy was devoted to assisting in upbuilding King's College and affiliated institutions.

Dr. Hind was, in one sense, a natural philosopher of the old and most admirable type. He possessed the wide interests, the literary cultivation, the high devotion and the profound faith that marked men like Tyndall, Huxley and Darwin. On the other hand he had all the alertness, directness, and broad commercial sense that are pre-requisites in modern scientific workers.

While he was a voluminous writer, he wrote only from the superabundance of his knowledge and observation. Consequently he wrote little that is not well worth reading.

Those whose privilege it is to have read Dr. Hind's works are forced to marvel at the variety and depth of his attainments. The whole book of nature was open to him as it is to very few of this generation. His whole life is an object lesson. A sound body and a sane mind were his. These, added to high and true ideals, gave to Canada one of the most distinguished scientists of the day.

THE FERNIE DISASTER.

All Canada was shocked when, on August 3rd, newspaper despatches announced that the town of Fernie was wiped out of existence by fire. Exaggerated reports were rife and it was freely stated that the coal mining industry of the Crow's Nest Pass district had received a blow that would cripple it for a long time to come. The loss of life was also the subject of much misstatement.

Latest reports indicate that not more than eighteen lives were lost. The loss of standing timber cannot be computed, although it is known to run up into the millions of dollars. Both the Crow's Nest Pass Coal Company, the C. P. R. and the G. N. R. suffered losses ranging from two hundred thousand to three hundred thousand dollars. The lumber companies' loss totalled about one million dollars.

So far as the property loss in the town of Fernie can be estimated, it appears to approximate seven million dollars.

Only slight damage was done to the mining and other equipment of the Crow's Nest Pass Coal Company. Neither Coal Creek nor Michel suffered. Production was resumed immediately after the fire had run its course. Temporary scarcity of labor is the only deterrant at present. At Hosmer the tipple and principal buildings of the C. P. R. colliery were unharmed. It had been the intention of the management here to commence shipments of coal and coke in December of this year. This intention will be carried out.

The fire swept resistlessly over an area thirty miles long and from two to ten miles wide. Once started no human agency could grapple with it. The conformation of the Elk River valley gave the fire a free hand and a full sweep. Hence Fernie, standing directly in the path of the flames, was destroyed in an incredibly short time.

Hardly a day elapsed between the destruction of Fernie and the arrival of relief from outside sources. The towns and cities of Southern British Columbia telegraphed funds, collected and despatched clothing and food, with astonishing and gratifying promptitude. Winnipeg, Toronto, Ottawa, Kingston and other eastern cities contributed with corresponding speed. The British Columbia Government gave its agents *carte blanche* so far as money and supplies are concerned. The railways transported passengers and freight free of cost from and to the scene of the disaster. The Crow's Nest Pass Coal Company bent all its energies to relief work and contributed a substantial sum of money in addition. Its buildings were put at the disposal of the shelterless, and its officers were prominent in the arduous work of organization and administration.

But most gratifying of all was the generous action of the city of Spokane on the other side of the international boundary. This city was among the first to telegraph money to the sufferers. In this is displayed a spirit that is more than merely praiseworthy, a generosity that is not hedged in by restrictions of nationality. The Canadian nation, as a nation, should make fitting acknowledgement of Spokane's timely help.

THE INTERNATIONAL NICKEL COMPANY.

The sixth annual report of the International Nickel Company is a document of more than passing interest. So complete is this corporation's control of the nickel markets of the world that it has practically no competition. It owns and operates the Sudbury copper-nickel mines. It controls the Nickel Corporation of London and the Societe Miniere Caledonienne of Paris, and through these organizations has been able to make its monopoly almost absolute.

The limited demand for nickel has robbed this monopoly of its sting. The International is constantly striving to find new uses for the metal and thereby to widen the market.

Its efforts have not been unsuccessful. In the last twelve years the United States consumption has grown from 4,000,000 pounds to 20,000,000 pounds per annum.

Unlike other copper smelting companies, the International has not only maintained its earnings but has increased them. Upon its common stock it pays no dividends as yet. Upwards of $5,000,000 has been spent in new construction and general improvement of plant.

For the last fiscal year, ending March 31st, its net profits are announced to be $1,324,742. Expenditure upon construction and equipment amounted to $1,548,-481; for depreciation of plant the sum of $215,975 was allowed; for exhaustion of minerals, $94,351, and $168,250 for bond sinking fund. After payment of bond interest and a 6 per cent. dividend on preferred stock, the sum of $790,000 was added to surplus, and $300,000 added to the property depreciation allowance.

The International Nickel Company appears to be one of fortune's favorites. It is interesting to speculate as to what its net profits would amount to if present conditions were so altered as to permit and encourage competition in the smelting of copper-nickel ores in Ontario.

ENTER NEW ZEALAND.

A New Zealand coal mining concern is seriously contemplating the possibility of entering into competition with the Vancouver collieries.

We had occasion lately to allude to the high prices maintained by the collieries operating in Vancouver Island. The fact that competition from New Zealand is even imaginable does not speak well for the spirit that animates the Vancouver Island operators. Our conviction is that the price at which coal is sold in Western British Columbia could be lowered fifty per cent. and still leave a sufficient profit.

THE GREAT WAIHI MINE.

Written for The Canadian Mining Journal by J. M. Bell, Director of the Geolagical Survey of New Zealand, and Colin Fraser, Mining Geologist.

INTRODUCTION.

In a graphic article in the Mining and Scientific Press, on "The Great Gold Mines,"* Mr. T. A. Rickard includes the Waihi Mine of New Zealand in the world's sixteen great gold mines, and mentions that the choice for the premier position among these rests between the Robinson Mine of the Transvaal and the Waihi. In the concluding remarks of the article he places the Waihi second to the Robinson only on the score of the larger, definitely-ascertained ore reserves in the latter.

The Waihi Mine is situated within the limits of the town of Waihi, in the Hauraki Mining Division, Auckland Province, New Zealand. The mine lies in an easily accessible locality, some seventy miles southeast from the city of Auckland, the metropolis of New Zealand, with which it is connected by rail.

The Martha lode, which is the vein of most conspicuous outcrop in the Waihi District, was discovered in 1878. The initial operations on the Martha lode by the original prospectors, and by the Martha Gold Mining Company subsequently floated, were not successful. In 1890 the Waihi Gold and Silver Mining Company, Limited, which had been formed in 1887 to work the Amaranth lodes, bought the Matha Company's property for £3,000. Even this venture can hardly be said to have met with great success till the inauguration of the cyanide process in 1894. Since that date the rise of the Waihi Mine from the rank of an insignificant prospect to that of one of the foremost gold mines of the world has been rapid and consistent.

The area held by the Waihi Company amounts to 765 acres. This area covers not only the Waihi Mine proper located on the Martha lode and adjoining veins, but also the Silverton, Union and Amaranth veins on the Silverton Hills, which are, however, not being worked at present, and are consequently not considered in this article. Continuous along the line of strike of the Martha lode, in a general northeasterly direction from the Waihi Company's property, are in succession the holdings of the Waihi Grand Junction, the Waihi Extended and the Waihi Consolidated companies, while a separate holding of the first-named company bounds the Waihi Mine to the westward.

General Physical Geography.

The workings of the Waihi Mine are situated on the slopes of Martha Hill, on the slopes of the Silverton Hills, and beneath the stretch of flat-lying ground half a mile wide between these two physical features. The Martha and the Silverton Hills stand at the northern edge of the gently rolling Waihi Plain. This plain, which is about seven miles from northwest to southeast, and rather more than four miles at its greatest extension in the opposite direction, has an altitude of about 280 feet above sea level, and is surrounded by low hills, showing smooth slopes and few rock ledges. The hills are continued northward from Martha Hill as the mountainous, densely forested country, which forms the backbone of the Hauraki Peninsula. Martha Hill is connected with this elevated country by a ridge, which may be spoken of as the Martha ridge, rather lower in altitude than the hill itself. The Silverton Hills are low features forming outliers from the mountains, within the plain. The relatively extensive Waihi Plain, through which meanders the Ohinemuri stream, represents topographically an old lake basin. Formerly the Ohinemuri flowed to the east coast of the Hauraki peninsula, but the damming of its course in that direction by a rhyolite flow resulted in the development of the lake above mentioned. The basin now drains westward through the wild and beautiful Karangahake gorge to the valley of the Thames. The plain is covered only by low manuka scrub, of little commercial value save as firewood, but the more elevated country is forested with larger trees eminently suitable for mine timber.

General Geology.

The oldest rocks that can be inferred to exist in the Waihi goldfield are argillites and grauwackes of Jurassic and pre-Jurassic age, which form the basement series of the whole Hauraki peninsula. Since, however, no outcrop of these sedimentaries has been located within a radius of twenty-five miles of Waihi these rocks may here be regarded as comparatively deep seated.

Tertiary volcanics comprising dacitic, andesitic and rhyolitic lavas and pyroclastics, form the whole of the superimposed rock complex.

The oldest of the volcanics exposed in the Waihi area are dacitic lavas which were ejected upon an old land surface of argillites and grauwackes probably when the land stood at a considerably higher elevation than at present. These dacites, which are the rocks in which the gold-silver bearing veins occur, have but a very limited areal extent at the present surface, since they are in great part covered by the younger volcanics to be later described. In the locality under description outcrops of the vein-bearing dacites are to be seen only in the Martha hill and ridge, and on the Silverton Hills. Wherever encountered, they are highly altered by hydrothermal metamorphism. On the surface they are often weathered to a soft, unctuous clay-like material. The effects of hydrothermal alteration are especially apparent in the neighborhood of the various veins, where the dacites, though hard, are almost completely propylitized and seamed by stringers of calcite, quartz (both chalcedonic and highly crystalline), orthoclase (variety valencianite), in minor amount, and pyrite.* The vein-bearing rocks have been described as rhyolites,† but careful chemical and petrographical investigation have led the writers of the present paper to classify them as dacites.

Younger andesitic and dacitic lavas and tuffs overlie an irregular surface of the vein-bearing dacites. They form the higher hills in the vicinity of the town of Waihi, and in places occur intercalated between the vein-bearing dacites and the rhyolitic flows of the Waihi plain skirting the Martha and Silverton Hills.

Unconformity between the older vein-bearing dacites

*"Mining and Scientific Press," San Francisco, 4-5-07, p. 565.

*See paper by Waldemar Lindgren, Engineering and Mining Journal, New York, Feb. 2, 1905.

†"Rocks of Cape Colville Peninsula," Sollas & McKay, Vol. II., 1906, pp. 67-68.

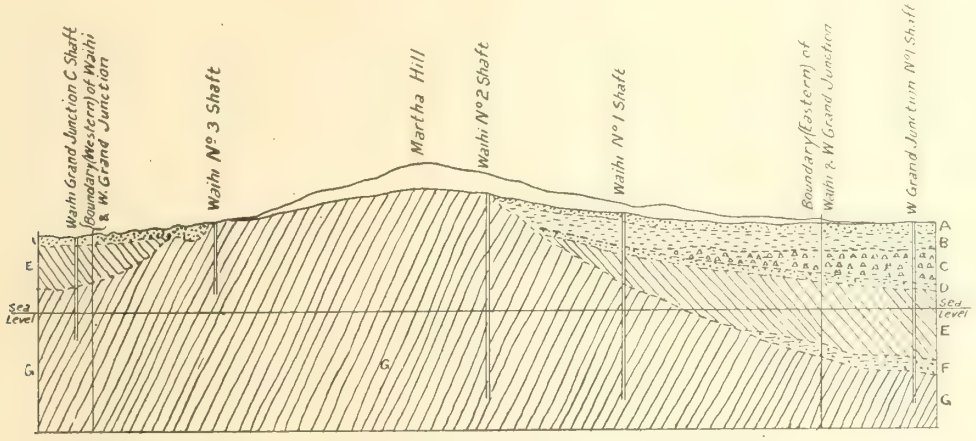
and the younger semi-basic volcanics is shown by an old land surface pierced in the Waihi Grand Junction shaft at a depth of 630 feet below the surface of the plains or 180 feet below sea level, where the occurrence of silicified carbonized tree trunks indicates former sub-serial conditions. The period of vulcanism to which these younger semi-basic rocks are referable was probably followed by a comparatively long period of quiescence, during which the country was deeply dissected by the Ohinemuri and its tributaries.

Subsequent to this dissection, volcanic activity preceded or accompanied by a considerable subsidence resulted in the extravasation of the rhyolitic lavas, which have very considerable development in the Waihi area. Three distinct petrological types are recognizable among these acidic volcanics. These, named in order of succession, are: (a) spherulitic rhyolite, (b) brecciated pumiceous flow-rhyolite, locally called "Wilsonite," and (c) gray lithoidal rhyolite. The spherulitic rhyolite forms the high bare hills not far from the town of Waihi, and the ridges extending therefrom to the eastern coast line. The peculiar, brecciated, pumiceous flow-rhyolite broken through and overlain in places by the gray compact flow-rhyolite, has filled in the old basin or ponded valley of the Ohinemuri before mentioned, and forms the surface rocks of the Waihi plain.

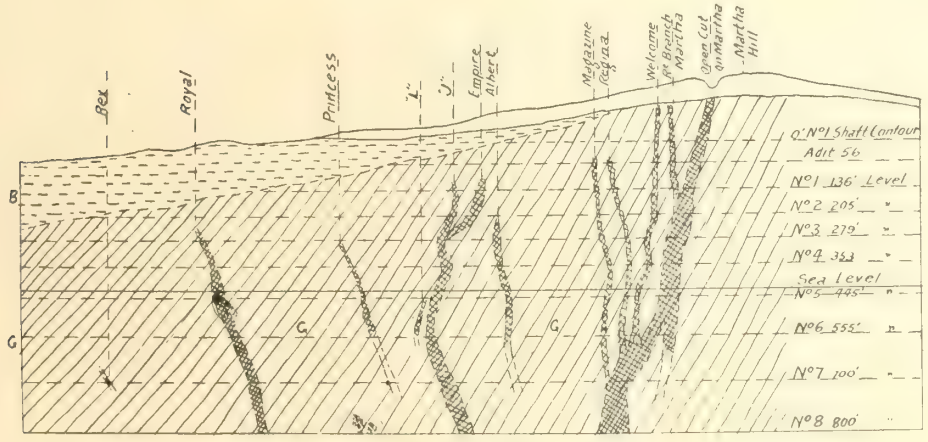
The loosely consolidated sands and gravels along the various streams consist of material derived from both the semi-basic and acidic volcanics.

The Martha Vein System.

As already remarked, the Waihi mine started its splendid course on the outcropping Martha lode. Now, that ore-body is but one of the many which comprise the complicated and branching series forming the Martha vein system. Some of these veins reached the surface, but, being covered by the layers of rock waste which is almost everywhere present, did not actually outcrop, while others were discovered only as the workings of the great mine advanced downward to the present lowermost level—1,000 feet from the surface—and on being worked upwards were found to feather out in the enclosing rock.



Vertical Cross Section through Martha Hill showing Geological Formation
Scale 500' = 1 inch



Vertical Cross Section showing Principal Veins of the Martha System
(Excepting Edward Vein which is Parallel to Section)
Scale 330' = 1 inch

The Principal Veins.

Altogether, some sixteen veins of the Martha system have in the past contributed or are still contributing to the output of the Waihi mine. The position of all of these veins and their relation to each other may

be seen by referring to the general plan of the Waihi Company's property. The separate plan of the veins being worked at the 700-foot level shows the connection between the several veins at that depth below the surface. The more important producers are the Martha, Welcome, Regina, Magazine, Edward, Empire, Royal, and Albert. Owing to the many remarkable variations exhibited by all of these veins certain somewhat burdening details appear necessary to their description.

The Martha Vein.—The Martha lode, the earliest ore-body to be worked, is still a very important producer, and so far shows, in descending, increasing width and no diminution in quality of pay ore. The vein, which has a general north-north-easterly trend, dips to the southeast at varying angles approximating 75°.

The Martha is traceable throughout the Waihi Company's mine for a distance of 3,400 feet, and it also extends into the property of the Waihi Grand Junction Company. From the latter company's mine a branching reef—the Junction No. 2—is continued into the Waihi extended claim, and thus a longitudinal extension of almost a mile of continuous quartz is proven along this remarkable vein. In the Waihi Company's property at the 136-foot level,* the Martha gave payable ore for a length of 1,100 feet, while in the 850-foot level it has yielded payable ore for 1,200 feet in the northeastern part of the Company's property with very low grade vein material along its west-southwest extension. In the 850-foot level there still remains some 300 feet of an unproven block from the present face of the north-easterly drift on the vein to the boundary of the Grand Junction property. This block is probably payable since the vein shows good ore where it enters the Grand Junction at this level. The pay shoot of the Martha lode has apparently a high pitch towards the northeast from the surface to at least as far downward as the 850-foot level.

At the surface the Martha varied in width from 5 feet to 50 feet with an average of 25 feet, while in the 850-foot level it varied from 20 feet to 120 feet, with an average of 67 feet. This greatest width of vein material occurs after the Welcome, Regina and Magazine have joined it on the dip to form practically one continuous vein. In the newly opened 1,000-foot level excavation has not yet proceeded sufficiently far to prove the Martha or any other vein of the system.

In the upper levels of the mine where the ore was mainly oxidized the Martha was payable from foot-wall to hanging-wall, but lower down the values were chiefly confined to the rich sulphide portion along the foot-wall. Still lower down on the Martha below the junction of the Regina and the Magazine at the 700-foot level, the values occurred mainly on the side on which these veins joined, namely the hanging-wall. Where the Martha is widest, namely, 120 feet, only about 50 feet afforded pay ore. In the 136-foot level a few feet of rich sulphide ore appeared in places on the foot-wall. Thence downward, level by level, the sulphide portion increased in thickness, and from the 445-foot level became the principal ore. In the 555-foot level the oxidized ore ceased to be conspicuous, and in the 850-foot level it has practically disappeared.

The average value of the pay ore from the Martha, according to the mill returns, has preserved a striking uniformity from the outcrop to the greatest depth yet attained (850 feet), that is, through a vertical height of 1,055 feet. This value is approximately £2 14s. 0d. per ton (2,000 pounds).

Welcome Vein.—The Welcome vein is traceable from the surface to and below the 850-foot level. From the 279-foot level downward it meets the Martha in a junction pitching in a south-westerly direction, along the inclination of the Martha. Thus its longitudinal extension diminishes from level to level when followed downward. The Welcome is disposed almost vertically, although in places where it approaches the Martha it dips slightly towards the latter, that is, to the northwest. Its general trend is slightly more northerly than the Martha. In the uppermost level of the mine, the pay-shoot of the Welcome was not less than 1,350 feet long, and the vein was traceable for quite 2,200 feet. The payable ore, however, diminishes in longitudinal extension in descending, and at the 850-foot level extends for only 250 feet in length westward of its junction with the Martha. At the surface the Welcome averaged about 20 feet in width—all payable ore, while at the 850-foot level the vein averages quite 75 feet and varies from 20 feet to 100 feet. Even where 100 feet wide the vein is nearly all payable ore, only about 10 feet of stone occupying a median position being unpayable. This low-grade material forms a convenient pillar between the two payable portions which are being stoped separately.

Regina Vein.—The Regina, which is a much less prominent vein than the Martha or the Welcome, did not appear at the surface and was discovered only at the 279-foot level as a branch of the Welcome. From this level it was traced upwards to the 136-foot level. Dipping at a high angle in a north-westerly direction towards the Welcome, it becomes part of this larger vein throughout its course at the 700-foot level. As the north-eastern part of the Welcome at this level junctions with the Martha, the Regina also forms part of the latter, though, in stoping, the ore is reported as coming from the Regina section of the Martha. The Regina vein material is nearly all payable ore and of rather higher average value than that of the Martha. In the 279-foot level the vein varied in width from 1 foot to 15 feet, and averaged quite 7 feet for the 550-foot stope length of the pay-shoot.

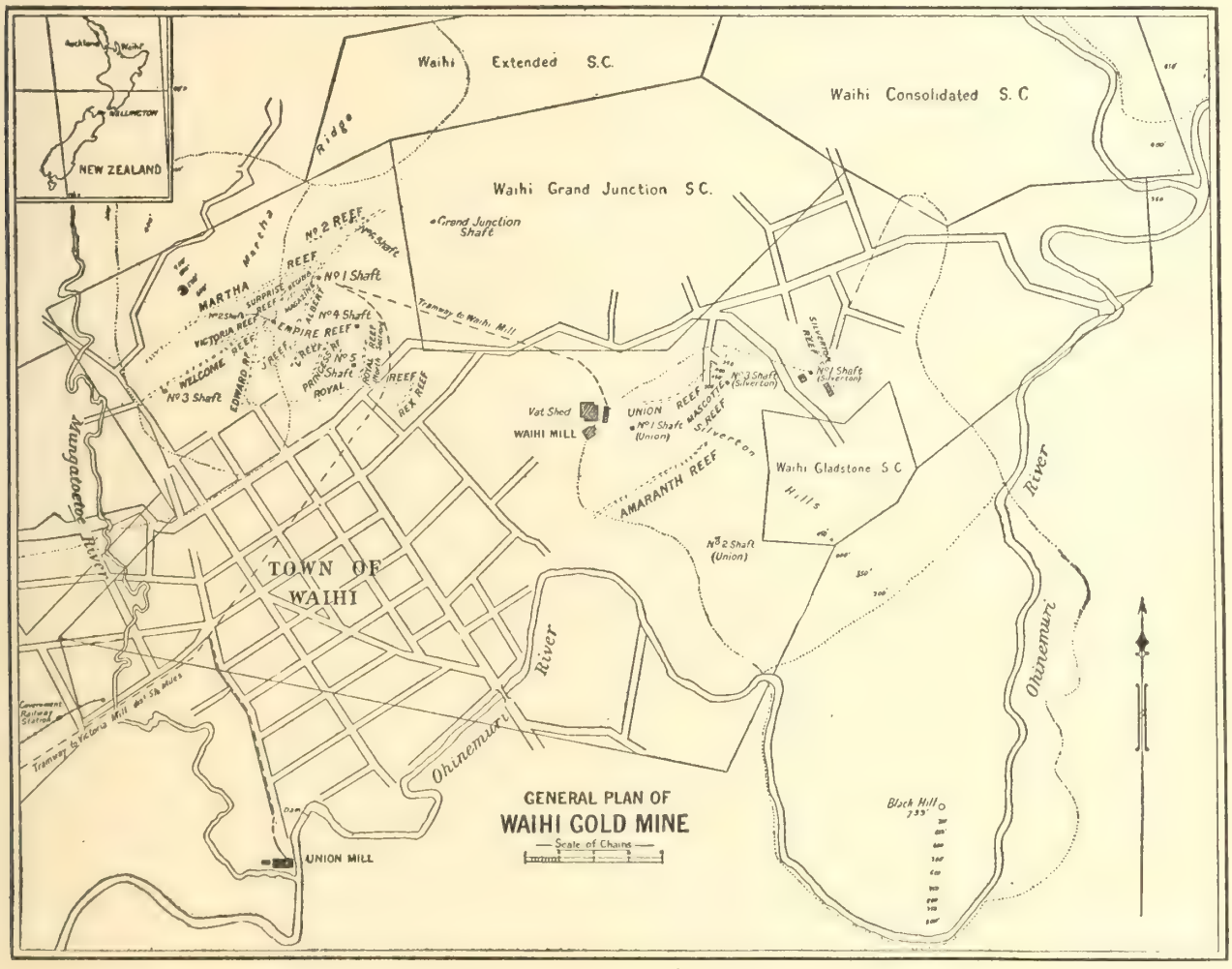
Magazine Vein.—The Magazine, like the Regina, is an off-shoot of the Welcome from which it branches at the 205-foot level. It dips at an angle of 75° in a north-westerly direction towards the Regina, Welcome and Martha, uniting in dip with all of these at the 700-foot level to form the great mass of vein material in the Martha at and below that level. The length of the Magazine at the 279-foot level is about the same as the Regina. It varies in width from a line to 15 feet, and averages quite 8 feet. The ore in the vein is all low grade, assaying in gold not more than 8 dwts. to the ton at the higher levels and as low as 5 dwts. near its junction with the Regina at lower levels.

Edward Vein.—The Edward vein is in some respects the most remarkable and interesting vein of the whole Waihi system. It was discovered only at the 700-foot level on driving west along the Empire, but was afterwards traced upwards to a point 40 feet above the 445-foot level, at which point it feathers out to zero. The vein, which runs nearly north and south, connects the Welcome with the Royal. In the 700-foot level the pay-shoot has a length of 750 feet and a width

*All the levels are measured from the collar of No. 1 shaft which is 426 feet above sea level and 205 feet below the original summit of Martha Hill or the highest point of outcrop of the Martha lode.

varying from 3 feet to 18 feet. In the 850-foot level the vein has improved greatly both in dimensions and ore-values. It varies in width from 27 feet to 92 feet, and its average is certainly not less than 54 feet. At its point of maximum width—some 250 feet south of its junction with the Welcome—the vein bifurcates, 16 feet of material forming the eastern and 6 feet the western branch. These two branch veins themselves fork, the larger forming two veins, 16 feet and 15 feet wide respectively, the smaller, two veins each 6 feet wide.

In the 700-foot level the Edward dips to the north-west at a high angle, but in the 850-foot level where the vein is widest, the great ore-body appears like an inverted wedge, the two walls dipping respectively to



the east and to the west. Practically all the vein material of the Edward constitutes highly payable ore, and in some places is of bonanza richness. On the 850-foot level at its junction with the Empire, where it is 75 feet in width, the ore values average no less than £10 10s. 10d. to the ton.

Since the Edward is connected with the Martha through the Welcome, and since, as already mentioned, the chief values of the Martha at the 850-foot level are confined to its north-eastern part, together they form a continuous wide band of highly payable stone from a point near the Royal to, and possibly beyond, the Waihi Grand Junction boundary.

Empire Vein.—The Empire vein may be considered as an eastern branch of the Welcome and of the Edward at horizons above and below the 555-foot level respectively. It first appeared in the 136-foot level and was there stoped for a length of 300 feet, while in the 850-foot level the pay-shoot has been already proven for a length of 1,150 feet. The course of the vein from its junction with the Welcome and Edward is a little south of east. The inclination of the vein presents a peculiar warped effect: on its eastern extension its dip is about 72° to the north; near its middle course, where influenced by junction with the Albert, it is almost vertical; and further westward on approaching its union with the Welcome and Edward, its dip is about 60° to the south. The average width of the vein is 6 feet at the 136-foot level, and increases gradually to about 25 feet at the 850-foot level. The whole of the vein-stone from wall to wall within the limits of the pay-shoot is milling ore.

The Royal.—The Royal vein was discovered at the 353-foot level, and is traceable upwards for 50 feet above the 279-foot level, at which point the drifts and stopes run out against the non-mineralized rhyolite which overlies at this point the vein-bearing dacite. At the 279-foot level the pay-shoot was somewhat over 300 feet in length, while at the 850-foot level this dimension has risen to 1,400 feet. The vein trends almost east and west and dips to the northward at 76°. The average width is about 10 feet at the 279-foot level, and, gradually increasing downward, is not less than 17 feet at the 850-foot level.

The Albert.—The Albert vein, discovered in the 205-foot level, extends downwards through all the workings. Its general trend is about north-northeast, and its dip is to the westward at a high angle. The Albert has yielded good ore from the 205-foot to the 555-foot level, but is one of the few veins of the Waihi which has shown in descending, values inferior to those of the upper levels.

Output of the Various Veins.—The following tabulation note showing in what proportion the various veins of the Waihi mine contributed to the total output in the year 1907, is of interest:

Vein.	Tons (2,000 lbs.)
Martha	177,800
Royal	46,645
Empire	45,660
Welcome	43,539
Edward	13,239
Albert	12,231
Regina	4,339
Victoria	3,871
Princess	3,076
Magazine	2,252
Reef I.	1,528
No. 2 Reef	1,346
Reef J.	1,208
Rex	240
	356,974

The Vein Material.

The vein material of the Waihi mine may be broadly divided into four types, which, for convenience, will be discussed separately:

(1) Sulphide ore.
(2) Non-payable vein filling.
(3) Oxidized surface vein material.
(4) Surface sinters.

(1) The sulphide ore which is now almost the entire source of the mine's wealth, as already remarked, appeared in the 136-foot level of the mine, and has increased rapidly in quantity in each successive level though there is still a very little oxidized ore at the 850-foot level. The sulphide ore consists of two rather indistinct varieties, namely, the banded ore and the replacement ore. The replacement ore, which seems to have been in greater part the original material formed, consists apparently of highly mineralized country rock. So intense has been the mineralization that the original nature of the rock has been entirely lost save in rare cores in the vein material. The replacement ore is mainly quartz of a general greyish or pale greenish color, and of finely crystalline or of finely saccharoidal texture. Through this is disseminated in individual grains, bunches, or tiny irregular veinlets, sulphide material consisting of pyrite, argentite, spalerite, and rarely of galena and chalcopyrite. The greenish color of the quartz is due mainly to chlorite, or some similar mineral. Druses, showing small hexagonal crystals of quartz, occur but are rare. Calcite is an occasional constituent, and there is evidently some manganic carbonate present as judged by coatings of black oxide in the oxidized ore.

The banded sulphide ore, which is always rich, shows narrow wavy bands consisting almost entirely of sulphides intercalated with others of finely crystalline quartz of milk-white colour, or tinted greyish or faintly blueish by disseminated sulphides. The banded sulphide ore occurs in narrow veinlets of irregular vertical and lateral dimensions within the replacement ore. The phenomenon of crustification is generally apparent in the veinlets, bands of quartz and sulphides being arranged on either side and not infrequently with drusy quartz in the middle. Visible electrum occurs in connection with the sulphide ore, but is not common. Ruby silver and wire metallic silver have also been found in the sulphide ore, and some selenium mineral occurs, as evidenced by the presence of that element in the bullion.

It is interesting to note that the gold values occur mainly in pyrite, and to a less degree in the rarer minerals in galena and sphalerite, as proved by analyses. An assay made at the office of the metallurgist of the Waihi Company, of one of the dark bands in the sulphide ore from the 850 ft. level, showed gold to the value of 7.25 ozs. to the ton, and silver to the value of 870 ozs. to the ton. The proportion of silver to gold is exceptionally high in this sample, as judged by the average fineness of the total bullion out-turned, in which the proportion of silver to gold is as 100 to 15.

(2) The non-payable vein filling consists partly of altered dacite and partly of quartz and calcite, through all of which more or less pyrite occurs, though the other sulphides are rare or wanting. Calcite is comparatively rare in the upper levels of the mine, though platy or rhombohedral quartz which is pseudomorphous after that mineral, testifies to the former occurrence of calcite in great quantity. The secondary quartz of this nature is often only a framework of the original calcite, and is consequently exceedingly powdery. This characteristic renders the separation of the non-payable material from the rich sulphide ore in places a matter of difficulty, especially on the Martha vein in the Grand Junction Mine. The original quartz of the non-payable ore is generally milk-white in colour and more closely crystalline than that of the sulphide ore. It is very rarely amethystine in character.

(3) The oxidized vein material represents the oxidized equivalents, both of the non-payable vein filling and of the sulphide ore. At and near the surface in the Martha lode all of this oxidized material was payable and that on the foot wall highly so. The highly payable oxidized ore of the Martha is the result of oxidation and consequent slight surface enrichment of the pre-existing sulphide ore; while the poorer hanging-wall ore contains its relatively low values, as the result of the concentration by descending oxidizing waters, of the gold and silver contained in the small amount of sulphides disseminated in the original hanging-wall vein material. The hanging-wall material is almost entirely oxidized as far down as the 555 ft. level, while, as already mentioned, sulphide appears on the foot wall at the 136 ft. level, and, increasing in width at each successive level, has almost completely replaced the rich oxidized ore on this side at the 555 ft. level. Below the 555 ft. level the hanging wall vein material, exhibiting less and less oxidation, has not been subjected to the enrichment specified and is therefore low-grade, and passes down into the non-payable vein filling. The latter nearly always contains a little gold and silver, and shows in places oxidation along fractures even to the 850 ft. level. In addition to the Martha, the Empire and the Welcome both showed rich oxidized ore.

The oxidized vein material is generally rusty and in many places blackish with hydrous oxides of manganese. Free gold is rarely visible, even in the richest material

though, finely disseminated, it exists in considerable amount. At the surface films of leaf gold were not uncommon in the joint planes. The quartz associated with this oxidized material shows fine crystalline, saccharoidal and platey structures. An assay made of a sample of rich oxidized ore from the Martha lode gave an analysis by Mr. P. G. Morgan, of the N. Z. Geological Survey, the following result*:—

Moisture at 100° C.	.26%
Loss on ignition	1.60
Silica	89.98
Ferric oxide	5.62
Alumina	1.82
Manganese and nickel oxides	.39
	99.67

Gold, 2 ozs. 5 dwts. 17 grs. per long ton.
Silver, 10 ozs. 2 dwts. 12 grs. per long ton.

The oxidized surface material on the Martha cannot be considered in the light of what is ordinarily called a gossan or cap of concentrated metallic minerals. The quartz was merely stained with iron and manganese oxides. There were no deposits of these minerals, and the values in gold and silver, even in the richest oxidized foot-wall ore, were little, if at all, higher than obtained in depth in the sulphide ore. Merely an oxidized surface capping of limited extent occurred, indicating that there has been time for little oxidation since the outcrop of the lode was laid bare.

*Transactions Australasian Institute of Mining Engineers, Volume VIII., page 182.

(4) The surface sinters, which frequently exhibit a banded structure, consist of a very finely crystalline or crypto-crystalline quartz, either whitish and opaque with rusty stains along the joint planes, or of a general pale rusty or pinkish colour.

The walls of the Waihi veins are in general fairly well defined. Owing to the fact, however, that much of the vein material of the Waihi Mine is merely metasomatically replaced country rock, there is in places no decided demarcation between wall-rock and vein material, but rather a gradual transition from payable vein material to propylite containing little or no values. Indeed, in such cases, what is to be classed as ore is often determined only by assay.

In many parts of the mine all of the several vein fillings show brecciation, and even fissuring, but faults of any magnitude giving serious displacements do not occur.

It is noteworthy that the vein material in general of the Waihi Mine bears a striking resemblance to that of the Redjang Lebong Mine in Sumatra, where the geological conditions are, it is understood, closely similar. A resemblance to the vein filling of the de Lamar Mine, Idaho, has also been cited by Waldemar Lindgren, while J. E. Spurr refers to P. G. Morgan's mention of the resemblance between geological conditions at Waihi and Tonopah, Nevada.*

*Geology of the Tonopah Mining District, Nevada. Professional paper, U. S. Geological Survey, No. 42, 1905, page 285.

*See also Engineering and Mining ournal, May 4, 1905, page 862.

(To be continued.)

Summary Report of the Mines Branch of the Department of Mines for the Year Ending March 31st, 1908.

The Summary Report outlines the work performed by the Mines Branch of the Department of Mines for the fiscal year ended March 31, 1908.

Dr. Haanel received his appointment as Director of the Mines Branch in May, 1907. By an Order in Council, dated June 19, 1907, Mr. John McLeish was transferred from the statistical office of the Geological Survey Branch to the Mines Branch. Later, a part of the chemistry section was similarly transferred. Messrs. T. Denis, F. G. Wait, M. F. Connor and W. W. Leach, officers of the Geological Survey, were also moved to the Mines Branch.

Iron Ore Deposits.

The most important field work performed during the year was the investigation of iron ore deposits in various parts of the Dominion.

Mr. Einar Lindeman was instructed to examine such of the iron ore deposits of Vancouver and Texada Islands as are favorably situated in regard to transportation, and to devote especial attention to the more promising of these.

With the exception of the bog ore deposits at Quatsino Sound, and a small deposit of hematite on Salt Spring Island all the properties visited showed magnetite all in the immediate vicinity of or in contact with crystalline limestone where the latter is in close proximity to igneous rocks. These magnetites are high in iron, do not exceed 0.05 per cent. phosphorus, but are also, as a rule, high in sulphur.

Vancouver Island.—In the Gordon River District, sixty miles from Victoria on the west coast of Vancouver Island, some promising prospects were noticed. The country rocks are chiefly crystalline limestone and igneous rocks, granite and diorites. About seven miles from salt water an outcrop of magnetite has been traced for 350 feet. In several places the ore is in sharply defined contact with granite. Ninety feet below this contact a tunnel, 114 feet long, has been run directly into the hill. It is in ore throughout its length, excepting where a diorite dike, eight feet wide, intrudes. The character of the ore is shown by the following analysis of an average sample taken along the tunnel:

	Per Cent
Silica	8.88
Iron	58.30
Sulphur	[illegible]
Phosphorus	0.013

A sample from another claim, farther up the valley gave this result:

	Per Cent.
Silica	4.51
Iron	67.09
Sulphur	1.60
Phosphorus	0.009

At Head Bay, on Nootka Sound, four outcrops of magnetite occur along a contact of crystalline limestone and diorite about a mile from the bay. At one place the ore body is fifty-five feet wide. The following analysis shows it to be of excellent character:

	Per Cent.
Silica	6.10
Iron	66.17
Sulphur	0.017
Phosphorus	0.016

Mr. Lindeman has serious doubts as to the extent of the Quatsino Sound bog ores. However, he recommends systematic drilling.

Seven miles up the Klaanch River an exposure of magnetite extends along the river bank for 180 feet and is from 25 to 30 feet high. No work has been done. This and other outcrops gave good analyses. Magneto-metric survey indicated other large bodies. Other considerable bodies were found on the Quinsam River.

Texada Island.—The principal ore deposits of this island are in the Prescott, Paxton and Lake properties. The Prescott has been worked more extensively than any other. During several years magnetic ore has been shipped from this property to Irondale, Washington. The ore outcrops about 850 feet from the shore, in a bluff on the brow of a steep hill, at the contact between granite and crystalline limestone. The deposit has been opened at three levels. An open cut shows a face of magnetite forty feet wide and one hundred feet high. Here the ore shows patches of calcite and fragments of brecciated volcanic rocks. Small amounts of iron and copper sulphides are also present. The ore dump gave the following analysis:

	Per Cent.
Insoluble	6.46
Iron	62.57
Sulphur	0.403
Phosphorus	0.024

The ore bodies of the Prescott are of great magnitude.

At the Paxton mine, 3,500 feet east of the Prescott, an outcrop of magnetite occurs directly in contact with granite. The ore is rich, but, like the Prescott ore, shows traces of copper, and is somewhat high in sulphur, though by no means prohibitively high.

The Lake mine, east of the Paxton, shipped 1,000 tons of ore last summer. The ore bluff is 80 feet high and 100 feet wide on the surface. Crystalline limestone forms the footwall, and diorite overlies the ore in places. An open cut shows good clear magnetite.

Coke carrying 15 to 20 per cent. ash is obtainable on Vancouver Island. This ash could be very much reduced by washing the coal. The ash is low in phosphorus.

Exceptionally pure limestone is obtainable at many localities.

Cheap transportation of raw materials is assured by the proximity to tide-water of all the more important deposits of iron ore, fluxes and fuels.

In addition to Mr. Lindeman's report, the following monographs are in preparation: "On Chrome Iron Ore Deposits of Eastern Townships," by Fritz Cirkel, M.E., and "Report on the Iron Ore Deposits of Western Ontario," by F. Hille, M.E.

Part I. of Dr. J. E. Woodman's report on the iron ore deposits of Nova Scotia is in the press, and reports on the iron ore deposits along the Ottawa and Gatineau rivers.

Electric Smelting.

Progress in electric smelting is confined at present to the production of high class steels. Both the Heroult and the Kjellen furnaces are being enlarged. The electric process is gradually displacing the crucible process in the manufacture of high grade and alloy steels.

The Lash Steel Process.—The Lash Steel Process, in which finely divided ore is intimately mixed with carbon, a certain quantity of finely divided carboniferous iron, sawdust and suitable fluxes, and the whole treated in an open-hearth furnace in a bath of molten metal, is one of the most recent inventions. It is claimed that in using the Lash mixture in an electric furnace no bath of pig iron is necessary, and a yield of 98 per cent. of the metallic contact of the mixture is recorded.

A typical mixture, all of which is finely divided, is as follows:

Iron ore	54
Cast iron borings	27
Sawdust	4
Limestone	4
Coal tar	3
Coke	8
	100

If the average cost of producing one ton of ingots in the regular open hearth be taken as $20.79, the corresponding cost for the electric furnace, using the wash mixture is $16.22.

Other Work.

The results of Mr. Erik Nystrom's investigation of the utilization of peat have already appeared in a recent special pamphlet.

The hand-book dealing with the mining and metallurgical industry of Canada is soon to be issued. It will appear annually with necessary revisions. Only producing mines and metallurgical plants in actual operation have been reported upon.

For more than a year Dr. J. B. Porter, Mr. H. F. Strangways and Mr. C. Landry, all of McGill University, have been conducting for the Mines Branch a systematic investigation of the coals of the Dominion. A complete report is expected before the end of next year.

Mr. John McLeish's report on the work of the statistical division makes interesting reading. Mr. McLeish urges the standardization of statistical methods throughout the Dominion.

Other features of the Summary Report we are not now able to take up. The report indicates a decided activity and progress on the part of the Mines Branch. But as an official document it does not show evidence of sufficiently careful editing. In arrangement it is loose. Certain sections are carelessly worded. For these faults there is the excuse of haste. But it would, we think, be in keeping with the dignity of the Mines Branch to see that these failings are remedied.

THE LARDER LAKE DISTRICT.

H. E. T. HAULTAIN.

> "It is always an unexplained wonder how the public tolerates these wild-cat promoters. Many hard-headed business and professional men who have all their life been building up and caring for their reputations, have allowed them to be prostituted in these wild-cat prospectuses."*

An investigation into the psychology of the enterprises connected with this district would be of more value to the public than anything that can be said concerning its geology. It was an ideal field for the wild-catter, and this was taken advantage of most skillfully. Only the general slump saved us from an extensive and disastrous boom in gold shares.

Ontario's appreciation of the relations of otherwise honest men to wild-catters is sadly in need of adjustment. The public's understanding of the mining engineer's philosophy (which indeed ranks with the doctor's and far above the lawyer's) is misled by these wild-cat prospectuses and their prostituted supporters. Some day, some man, altruistic and clean-minded, will explain clearly and persistently to the Ontario public, in a way that it will understand, that mining is not only founded on science, but is a difficult art based on experience, and that the main ingredient of the mining engineer must be honesty. Until this is done, until this is absorbed, or, rather, assimilated, Ontario will continue to look for booms and continue to put a premium on wild-catting.

Larder's early days were characterized by wild-cat promotions of a very clever kind. Some of the prospectuses were the cleverest issued in Ontario. One in particular stands out for the completeness of its non-essentials and the subtle evasiveness of its misrepresentations. Its title page contained the names of some of our best-known professional and business men as directors. It was complete with its bankers and solicitors and its "consulting engineers." But it contained no vestige of reliable information in regard to its ore bodies. Such reference as was made to these was purposely misleading. To anybody with even a slight acquaintance with mining, it was a most palpable fake. The company had territory and nothing else. One cannot blame the public for buying shares in companies supported by the names of good men, but most unhesitatingly must we condemn the action of men who lend their names to such wild-cat promotions, and it is high time that reputable engineers took steps to condemn publicly as wholly unprofessional (and consequently unreliable) engineers (alleged?) who allowed their names to stand on such prospectuses.

This wild-catting was so prominent a feature of Larder Lake that the whole district received a black eye, and it was hard to make anybody appreciate the fact that any good could exist up there. The arresting of Law and the letting him out on thirty thousand dollars bail had a wholesome effect towards educating the public, but did not help the district. Now, however, some of the men who helped the wild-catters find themselves with unprospected claims on their hands, and are rising to their responsibilities with honest intention in their efforts. Besides the wild-catters, there have been a few individuals and at least one company that have been working more or less steadily, and the whole district has now a much healthier tone.

The Ontario Bureau of Mines has issued an excellent report by R. W. Brock on the district, much of which has been published in the Canadian Mining Journal (January 1st and 15th, 1908). There is really but little to be added to this report, except to emphasize some of the matters that Mr. Brock hints at. The main feature of the district is the belt of serpentinized dolomite (?) extending in an east and west direction for at least 12 miles, and probably further. This belt contains a fractured zone in which the network of fissures has been filled with quartz. The zone varies in width up to several hundred feet, and the quartz stringers themselves range in thickness from a knife-edge up to six inches or so, and occasionally a mass of quartz up to twelve or fifteen feet in width is met with. There are also well defined veins of quartz, but the network is the main characteristic of the district. At various points along the whole 12 miles of this zone visible gold has been found in the quartz, and in at least two claims very rich specimens have been taken out. The combination of wide ore bodies and occasional rich specimens was the ideal condition for the wild-catter, and even now the sight of these specimens never fails to stimulate even the most disappointed of the wild-catter's victims. Today the general mental attitude of most of those associated with the district is a gloating over these specimens, coupled with an unconscious (though really wilful) ignorance of the true values of the ore bodies outside of the specimen areas. It is true that several tons of rock have been sent outside to be tested, and I believe it to be also true that specimens were rigorously excluded from these test samples. Also there have been several "mill runs" made on the properties themselves, but personally I believe that every test so made prior to my visit in June was made on special ore and was not representative of the ore as it would be mined under commercial conditions. These mill tests have given results all the way from $8 to $50 in gold per ton, and they are of value in so far as they show that there is some pay rock in the district; but to connect these mill runs with the large ore bodies is misleading.

Though much money has been spent in the district, very little is really known about the extent or value of the pay zones. Four stamp mills have been erected. Two of these, a full-sized 10-stamp mill and a small 3-stamp mill, have been in operation. The other two mills have not yet been completed to the operating stage. Much money has been spent on shafts, tunnels, mine buildings and even gasoline launches, but very little has been expended on surface work on the alleged ore bodies. At one of the properties a responsible official informed me that in one of the shafts on his property, at a depth of two feet from the surface the ore assayed only two dollars, at a depth of ten or twelve feet it assayed $7, while at a depth of 35 feet it assayed $50. If the ore from this shaft would show an average value of $7 per ton, his property would very probably be one of the big mines of the world. If it averaged even $2 a ton, I should consider that the property had a great future. I asked the responsible official of another property why

*From a letter by the writer in the Canadian Mining Journal, Sept. 1st, 1907.

they did not make more effort to determine the value of the ore bodies. He replied that it was little use sampling on the surface; when his shaft was down 100 feet he would cross-cut and sample the ore body then. Now, these were two of the most important properties in the district, and these statements of the officials show the remaining influence of the wild-cat period.

That fiction about the increase of values with depth is one of the most important properties of the wild-catter and boomster. There is absolutely no reason, either from theory or practice, why the ore in the Larder Lake district should carry more gold at 100 feet depth than it does at the surface. As a matter of fact, the richest specimens yet discovered up there have come from the surface, but this is purely accidental. The surface is easily and cheaply prospected; that so little work has been done on it is due either to ignorance or else to the fear of exposing much barren or low-grade ore. The sinking of shafts before the surface has been properly prospected can only be of value for the purposes of selling stock. The same is of course true in an even greater degree in regard to the erection of mills. There is not a property in the district upon which sufficient work has been done to justify the presence of a mill, not even of the small three-stamp, so-called, prospecting mill.

The engineer who makes such statements is locally called a "knocker," and local inhabitants seek to discredit him. In reality the worst knocks the district has had lie in the work that has been done there. Not five per cent. of the money expended has been rationally used for the purpose of finding or exposing pay-ore bodies. The first function of the mills that are being completed at the present time will be to open the eyes of the shareholders to the limitations of the present ore bodies. Their function will be simply to disappoint, so that directors may take a new view of things and begin over again, begin to do what they should have done in the first place, viz., explore.

There are three stages in the proper growth of a mine: exploration, development, production. The present managers at Larder Lake are seeking to attain the last stage without either of the others. And Larder Lake is particularly a district requiring exploration. A large part of the fractured zone with its quartz stringers contains insufficient gold to pay; only here and there in occasional and irregular areas will pay-ore be found. These pay zones must be explored for, and this requires experienced men. It is still a matter of conjecture whether there are any pay zones of sufficient extent to pay for a mill, but probably such zones will ultimately be found. All the local conditions point to the possibility of the existence of some very large bodies of pay ore in this zone of serpentinized dolomite.

To the south and west of the lake discoveries have been made of an entirely different kind of ore. There are some well-defined veins containing massive pyrites, with appreciable quantities of copper. They are reported to contain good gold values. Some systematic exploration work has been done in this neighborhood. Cobalt bloom has been discovered on more than one claim.

Altogether, the district is not without promise, but it is a great pity that it has been so seriously handicapped by wild-cat and ignorant methods of work.

The statement and opinions I have expressed in regard to wild-cats do not apply to the Harris-Maxwell Company. The work done on their property is open to criticism, but their directors have shown a remarkable honesty of purpose.

Editor's Note.—We feel justified in appending a note of explanation to Mr. Haultain's article. Mr. Haultain's purpose is to waken a sense of responsibility in the owners and operators of Larder Lake properties. He and other competent judges recognize the fact that, in at least one case, honest work has been done and is being done. The property referred to is being sampled systematically and has a ten-stamp mill ready for operation.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

(*Continued from last issue.*)

No. 4 Colliery (Caledonia Mines).—Operations were first commenced at Caledonia on the present site in 1866, and shipments date from 1868. The original lessees built a railway along Big Glace Bay Beach, and shipped their product at what was formerly known as Port Caledonia, where they erected an extensive shipping dock, the remains of which are to be seen today half buried in the sand.

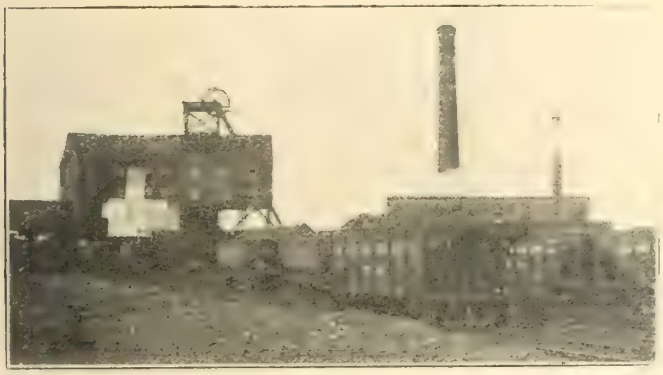
Since 1866 Caledonia has produced a little over 8,000,000 tons of coal, of which quantity 6,500,000 tons, or over 80 per cent., has been produced since the Dominion Coal Company took over the mine in 1893. At the present time the output of Caledonia is about 45,000 tons per month on single shift.

The most serious underground accident that has ever occurred in the Glace Bay Basin took place in this colliery. A fire originated in a pump house situated about 1,400 feet to the deep of the pit bottom, in what was known as the Old West deep. A party of men in charge of the underground manager were endeavoring to locate the fire when an explosion took place. From all accounts the explosion was a very slight one, and the 11 men who died were in all probability the victims of carbon monoxide poisoning.

The workings of Caledonia are very extensive, as may be judged from the length of time that the mine has been working. They are divided into two distinct sections by the coal pillar left for the support of Glace Bay Harbor and the creek that flows into it. The west side of the mine is an entirely land area. The east side workings are partly submarine, the most easterly levels being extended at the present time some 2,000 feet from the shore in the direction of No. 6 workings, up to the barrier against which the Caledonia workings will ultimately proceed. The territory between Caledonia east side and the workings of No. 6 Colliery is practically virgin, with the exception of the small area that was extracted from the workings of the Old Clyde pit

The Old Clyde coal mine had the reputation of being of excellent quality.

It will be noticed that in the sketch plan of the Glace Bay Basin, that accompanied the first part of Article II of this series, the outcrop of the Phalen seam is shown as a continuous black line across Big Glace Bay Beach, while those of the other seams are dotted. The Phalen outcrop has been proved by boreholes which



Dominion No. 3—Bankhead Approach.

were sunk in 1906, and there is absolutely no dislocation or alteration of the measures between the workings of Caledonia and those of No. 6 mine.

The coal shaft is 185 feet deep, rectangular, and untimbered except for the buntons and spears. It is 18 feet 10 inches by 11 feet, divided into two compartments, one for hoisting coal and the other for the man cage. The cages are of the standard dumping type used by the Dominion Coal Company, and were installed in place of the former platform cages when the plant was taken over. The guides are wooden.

The air shaft is 10 feet in diameter, circular in shape and is divided by a pillar of strata only five feet wide from another shaft of the same dimensions that was sunk side by side and originally intended to be used as a water shaft. At the present time the two shafts are connected at the surface and form in reality one air shaft. The main compressed air column is suspended in the last named shaft. The fan is a Dixon fan of the Guibal type, 14 feet in diameter by 6 feet 4 inches wide, and there is also a spare Murphy fan 12 feet diameter. The ventilating column is depressive, the coal shaft forming the upcast. The air is split at the bottom of the air shaft, one split ventilating the west side, and the other going to the east side where it is again subdivided into two splits. A new air shaft 15 feet by 10 feet finished dimensions inside the timbering and 160 feet deep has just been completed at a point on the shore line distant about one mile to the eastward of the fan shaft. This shaft will act as the upcast for the easterly split of the east side, and will eventually become the main return for the submarine workings of Caledonia.

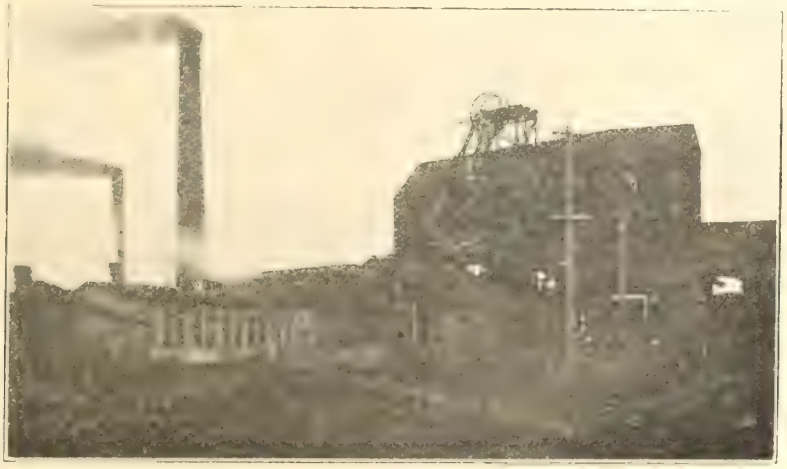
The surface power equipment consists of seven Babcock & Wilcox boilers rated at 1,380 h.p., fitted with Parsons' burners. There is a brick smokestack 125 feet high, and one steel stack 80 feet high.

The coal hoist is the same engine as was originally used at the Gardiner Mines in 1870, and was made by an English firm (Coupe). It is a horizontal engine with 20-inch by 48-inch cylinders, and an 8-foot drum using a hoisting rope 1⅜-inch diameter.

The man hoist was made by Matheson of New Glasgow. It has cylinders 18 inches by 24 inches and a 7-foot drum.

The haulage engine was made by the same people as the coal hoist, being part of the original equipment. It is a horizontal engine, cylinders 22 by 42 and a 15-foot fly wheel. It operates three endless haulages by clutch pulleys on a common shafting, namely the West Level rope, the West Deep rope and the East Deep rope, the length of the hauls being respectively, 6,200 feet, 5,900 feet and 3,500 feet, all using 1⅛-inch wire rope. The usual speed of the haulage is 1.75 miles per hour.

The compressor house is a concrete building and contains one American Rand compressor installed in 1897, steam cylinders 40 inches by 32 inches, air cylinders 36 inches by 22 inches, 48-inch stroke, 60 revolutions with a capacity of 3,200 cubic feet per minute; one Rand compressor steam 36 inches by 20 inches, air 32 inches by 20 inches, 48-inch stroke, 60 revolutions capacity 2,500 cubic feet per minute. There is also a small Ingersoll straight line compressor of 900 cubic feet capacity. An automatic lubricating system is to be installed, but is not yet in place.

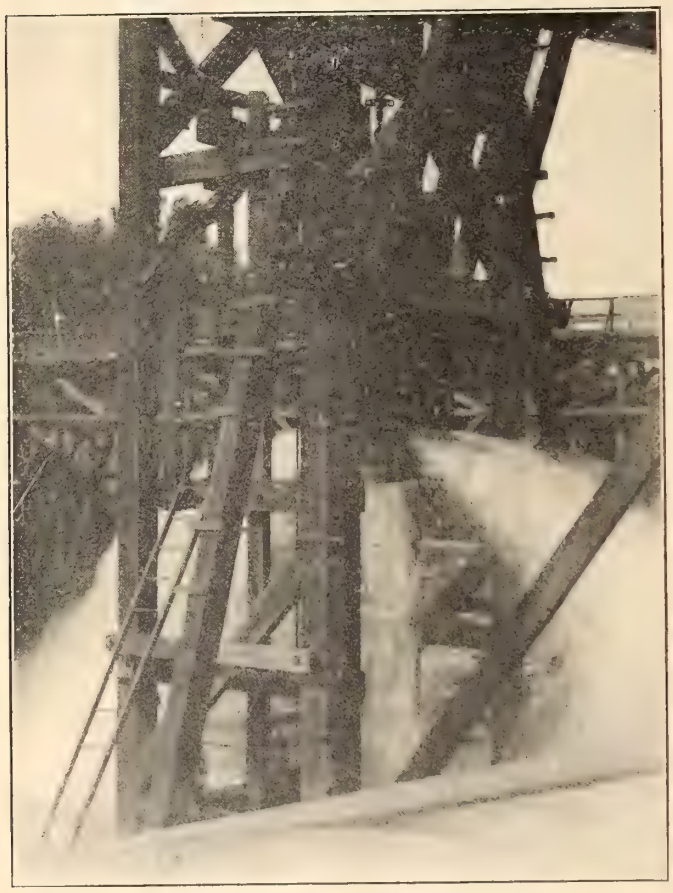


Dominion No. 4 (Caledonia)—Looking South.

The colliery surface and pit bottom are lighted by current obtained from the Central Electric Plant and transformed at the colliery.

The amount of mine water that has to be dealt with at Caledonia is greater than at any other collieries on the Phalen seam, as it deals not only with its own

water but with that of No. 3 Colliery to the westward. The water shaft, situated on the side of Caledonia Brook a short distance below the colliery, is capable of dealing with large quantities of water. The shaft, which was sunk in 1900 for the purpose of unwatering the mine after the fire, is 266 feet deep and is fitted with tanks having a capacity of 800 gallons each. These tanks are of the usual type with side outlets for the water. Side discharge tanks were formerly used here, but they have been discarded in favor of the present design as they are less wearing on the guides and generally more suitable. The hoist is a horizontal engine, cylinders 20 inches by 42 inches (Whiting & Shaw). The greatest capacity of the hoist is three tanks per minute, and it has lifted as much as 67,000,000 gallons of water in one month.



Caledonia Water Shaft.

The underground pumps have up to the present time been driven by compresed air, but is unnecessary to describe these as they are being replaced by an entirely new set of electrically operated pumps. On the west side there is a five plunger Aldrich pump with a capacity of 600 gallons per minute, and a twelve stage Gwynne centrifugal pump, driven by 150 h.p. Westinghouse motors. The pump house is built of brick with walls one foot thick, having projecting buttresses every six feet. The roof is supported by 20-inch steel girders. The floor is concrete and the whole construction is as nearly fireproof as can be made. The transmission lines are caried down a borehole situated on Chapel Hill at Glace Bay, and the discharge will be made through a contiguous borehole 590 feet deep.

The East Side boreholes are situated at Quarry Point and are about 440 feet deep. The pump house underground is of similar construction to that on the west side. The pumps are two 3-stage McDougall turbines driven by two 100 h.p. Westinghouse motors, and rated at 420 gallons per minute against a 450-foot head.

The discharge boreholes are 10 inches finished diameter inside the cast iron casing which is filled in with concrete. The transmission boreholes are not cased and are 6-inch diameter.

The current is transformed on the surface, the transformers house being situated near to the boreholes.

The surface erections comprise a machine shop, lamp cabin, warehouse, etc. The bankhead is a steel structure housed with corrugated iron and fitted with the usual screening arangements and picking belts. The wash house has recently been fitted with a sprinkler shower bath, an innovation which is being readily taken advantage of. Shower baths are the accepted and best method of cleansing for the use of miners after their work, as they are clean and sanitary, are economical in the use of water, and cleanse very effectively by reason of the mechanical effect of the falling water. They are much preferable to slipper baths which speedily foul unless kept with the most scrupulous care.

The firemen's hall, which Caledonia has, in common with the other mines, is shortly to have a shower bath and its compliment of Draeger apparatus.

The mine is fully equipped with A. & B. safety lamps, and fire fighting appliances. About 650 men are usually employed. The mine has in the neighborhood of 80 horses.

The population of Caledonia is composed mostly of life long residents, largely of Scotch Highland descent. The community boasts of a band o pipers who wear the garb of Old Gaul, and the "boys" of Caledonia have a Gaelic yell, which they use on befitting occasions, that would do honor to any McDonald that ever struck terror to the heart of the Sassenach with his slogan.

(to be continued.)

ACT ACCOMPLISHES GOOD.

Disputes Legislation Prevents Twenty-Eight Strikes.

Washington, July 18.—That the Canadian industrial disputes investigation act for the prevention of strikes affecting public utilities has accomplished the main purpose for which it was enacted is the conclusion drawn after a special investigation of the workings of the law by Dr. Victor S. Clark for the Bureau of Labor in a report made public to-day. From March 22, 1907, when the act went into effect, to January 15th, 1908, thirty disputes became subject to investigation and in twenty-eight cases strikes were averted or ended. The law prohibits a cessation of industry, under penalties, until by the investigation of an official board the public is officially informed of the grounds of the controversy, reliance being placed upon public opinion to prevent or shorten such disturbances.

The law provides for boards of conciliation and investigation. Dr. Clark reports that no employer was found who was not favorable to the law, as better than no legislation, as far as it applied to railroads, and that there is some sentiment in its favor among the rank

and file of the workers, though some representative labor leaders are opposed to it.

Among the public most of those who are practically familiar with labor matters approve the act. Its effect has been to cause the public to take an interest in many industral disputes quite as immediate and important as that of the conflicting parties. Apparently the law has not affected adversely the condition of workingmen or of industries where applied.

DEISTER SLIMER AND SUSPENDED TYPE VANNER TESTS AT COMBINATION MILL OF GOLDFIELD CONSOLIDATED MINES COMPANY.

	Average of All Tests.	
	Deister.	Suspended Type.
Total solids in feed per run in tons....	33.75	39.4
Total solids in 24 hours, in tons..	8.90	10.006
Value of feed per ton in ounces	.97	.97
Total value of feed in ounces..	32.736	39.40
Value of concentrates per ton in ounces	14.27	17,20
Per cent. of extraction by product....	41.89	32.51
Per cent. of extraction by assay of heads and tails..	40.10	35.85
Flow to callow tank in pounds per min.	137.7	
Dry solids in pounds per min.	16.36	
Water in pounds per min.	115.5	
Overflow of clear water in per cent...	48.15	
Per cent. of solids in discharge..	22.62	

The above table gives a record of the performance of the Deister, in competition with a suspended vanner. The tests were conducted during May and June of this year, at the Combination Mill of the Goldfield Consolidated Mines Company. As a direct result of the competition seventy No. 3 slime tables were ordered at once.

The new miners' lamp of Santa and Spelmans, of Brussels, is designed to give warning of danger, and is based on the principle that a flame like that of benzine remains constant in size and brightness under constant conditions, but is increased by such a gas as fire-damp and reduced by carbonic acid. The lamp has a protective casing of wire-gauze provided with external cooling ribs. It is surmounted by a refractory chimney, through the opposite sides of which pass the elements of a thermopile, and any variation of current is shown by a galvanometer in connection with these elements. If the flame is made larger and hotter by the presence of fire-damp, the thermo elements are affected, an increase of current intensity being indicated by the galvanometer needle. Carbonic acid gas, reducing the flame, is similarly signaled by a reduction on the galvanometer scale, and a recording apparatus connected with the galvanometer may be made to keep a record of the varying conditions in different parts of the mine's workings.

The idea of using house refuse for fuel, as is being so successfully attempted in the refuse-burning plants of large cities, is supplied on a small scale in the new fuel —called "coalescine"—of an English borough engineer. Garbage, bits of unburned coal from the ashes, and other waste, are pulverized, mixed with tar, and made into briquettes. This fuel is claimed to be not only perfectly hygienic, but to show high efficiency under boilers. The cost is so moderate that small towns are enabled to dispose of their waste by a practically self-supporting method.

A redistribution of the chemical elements—especially of the metals—has been going on through the agency of man for some thousands of years, and Mr. H. M. Atkinson, a British chemist, points out that the total effect must be considerable. The gold and other metals concentrated in small spots near the surface of the older rocks are being rapidly mined and put to use, the fine particles from their weir being carried down streams and eventually diffused through the deposits at the mouths of the rivers. Tin oxide, for example, is mined at a few places, spread out pretty uniformly over the earth, and in the refuse of towns the waste tin is oxidized, carried away by water, and on the sea bottom the fine particles are so scattered as to be beyond future recovery by any process known. The effect may be modified to some extent by the concentration of metals in solution and other causes. As the common receptacle of all waste, the sea must be slowly changing its composition from industrial processes—notably from soluble chlorides and other factory waste and from the salts of potash and lime that are taken from mines, and used on the soil by farmers.

Selenium, discovered by Berzelius in 1818, is a non-metallic element closely related to sulphur and tellurium. In darkness it is practically a non-conductor of electricity, but when lighted it passes current readily, and it is this unique variability that gives to the substance great possibilities of future importance. The curious property has been applied experimentally in various ways. It has given a means of transmitting speech along a ray of light, a method of guiding and exploding torpedoes by light, and it is employed for sending pictures by wire. It has been used also for measuring the Roentgen rays applied in medicine. Selenium, now selling at 50 cents to $2.00 per ounce, is a rare substance in little demand, but in the United States it has been produced experimentally from the anode slimes of the electrolytic refining of copper, and it is probable that a moderate supply can be obtained in this way.

In his new iron-making process, Dr. G. P. Layal, of Stockholm, finely pulverizes the ore, coal and other materials, and causes them to be drawn by a current of air or carbonic oxide in a continuous stream from the hopper through a delivery pipe into the furnace. The furnace is a vertical cylinder, with a tap hole for the iron and an escape hole for the gas near the base. The coal is burned to carbonic oxide in the upper part of the furnace, and the slag and reduced iron collect on the furnace wall and flow down to the lower end.

In a new French Welsbach mantle, the rare oxides are consolidated in an electric furnace, greatly increasing resistance to shocks, tremors and draughts.

THE TREATMENT OF STAMP MILL TAILINGS AT THE RICHARDSON MINE, GOLDBORO, N.S.

By E. Percy Brown, S. B.

The treatment of the tailings from the mine of the Boston Richardson Mining Company having been attempted in various ways, it may be interesting and instructive to outline the various steps and note the results obtained by the different methods.

For a general description of the mine and the characteristics of the ore, the reader is referred to an article in the "Canadian Mining Journal," June 15, 1907.

The first treatment of the tailings, outside of laboratory work, so far as the writer is aware, was at the Chlorination Plant of the Brookfield Mining Company, Queens County, N. S., carried out by the writer in July, 1897.

About one ton of concentrates, worth $18 per ton, was treated by roasting and chlorination, giving an actual extraction of 89 per cent. of the value in the roasted ore. The loss of gold in roasting was high and was probably due chiefly to the fact that it was impossible to avoid a loss of ore in handling so small a lot through the large furnace.

In consequence of the success of the treatment a shipment of one hundred tons or more of concentrates was made to the chlorination plant at Brookfield two or three years later.

It is understod that this treatment was not successful, probably due to the fact that the concentrates were old and had become oxidized and caked, so that thorough roasting was impossible.

The cost of roasting and chlorinating such ore in Nova Scotia was from $5 to $6 per ton with an expensive plant.

The next step was the erection of a very large cyanide plant at the Richardson mine to treat the mill tailings direct without concentration. While the percentage of recovery was satisfactory and no difficulty was met in treating the tailings in this way, the values were too low to admit of profitable recovery, being about one dollar per ton.

Early in 1905 Mr. H. S. Badger, assisted by the writer, superintended the installation of a Wilfley concentrator and made a trial treatment of the arsenopyrite concentrates by bromo-cyanide. These tests were so successful that five more Wilfleys were installed and the small cyanide plant, shown in the accompanying sketch was erected.

This process has been successfully used ever since and beyond a few difficulties easily overcome by experimental work has given no trouble.

The method of treatment used is based on the regular Sulman-Teed process with the exception that ordinary zinx box precipitation is used, giving entire satisfaction. In the clean-up the zinc box residues are treated with sulphuric acid, washed by decantation, dried on filter paper in large funnels and carefully roasted. The roasted slimes are then melted in a large graphite crucible with borax glass as a flux, giving a clean brick of gold. The sketch of the plant is self-explanatory. The shaking sluice (K) runs along the ends of the Wilfley tables and conveys the concentrates into the sump (H).

As no fall is available the concentrates must be lifted to the level of the treatment tanks.

A carrier (F) is used and is of such a pattern that the ore must be shovelled into the vats. This ensures an even distribution over the tank.

The method of handling may seem awkward, but the one man necessarily employed at this portion of the work has ample time to attend to his duties.

The following table gives in concise form the results for the year 1907:

Month 1907	No. Tons	Average Value Stock Per Ton	Total Value of Stock	Average Value Tails Per Ton	Total Value of Tails	ESTIMATED: Average Extraction Per Ton	ESTIMATED: Total Extraction	ESTIMATED: Per Cent	ACTUAL: Weight of Bullion	ACTUAL: Value Per Ounce	ACTUAL: Total Value	ACTUAL: Per Cent	LABOR: Total	LABOR: Per Ton	CYANIDE CHARGES: Total	CYANIDE CHARGES: Per Ton
		$	$		$	$	$		ozs	$	$		$	$	$	$
January	134.03	17.00	2268.51	3.23	432.91	13.77	1835.60	81	113.72	17.00	1933.24	85	110.50	0.81	44.00	0.32
February	143.03	21.74	3110.55	4.62	661.37	17.12	2449.18	78	147.00	17.76	2610.72	83	97.45	0.68	34.25	0.24
March	150.57	16.13	2420.35	4.26	639.10	11.94	1781.25	74	125.75	18.21	2288.76	94	110.00	0.75	22.00	0.15
April	185.12	13.87	2512.51	3.25	608.07	10.32	1904.44	75	120.75	17.51	2114.33	84	113.36	0.61	99.00	0.54
May	127.88	16.50	2105.46	5.07	649.24	11.53	1456.22	69	87.46	17.38	1520.75	72	111.67	0.87	101.50	0.78
June	123.15	17.02	2096.23	4.43	545.63	12.59	1550.60	74	90.46	17.00	1536.80	73	112.87	0.91	185.00	0.35
July	101.25	17.15	1737.02	4.87	493.64	12.28	1243.38	70	78.50	16.82	1320.37	76	108.28	1.02	87.00	0.86
August	58.35	15.24	889.76	4.51	263.28	10.73	626.48	70	55.75	16.78	599.38	67	108.00	1.85	48.12	0.82
September	96.20	15.48	1488.89	5.06	486.80	10.42	1002.09	67	61.75	16.35	1009.61	67	101.00	1.05	78.75	0.81
October	113.70	13.00	1478.33	3.95	449.94	9.05	1028.39	69	65.75	16.82	1104.23	74	102.50	0.90	87.50	0.77
November	107.40	13.07	1403.85	3.37	362.24	9.70	1041.66	74	69.60	17.13	1192.94	84	101.50	0.94	78.75	0.73
December	102.48	15.67	1609.70	4.47	459.41	11.20	1150.25	71	57.00	17.40	994.68	61	102.50	1.00	204.00	2.00
Total	1443.36		$ 23121.16		$ 6.087.68		$ 17.047.48		1053.87		$ 18.226.08		1268.81		1.070.00	

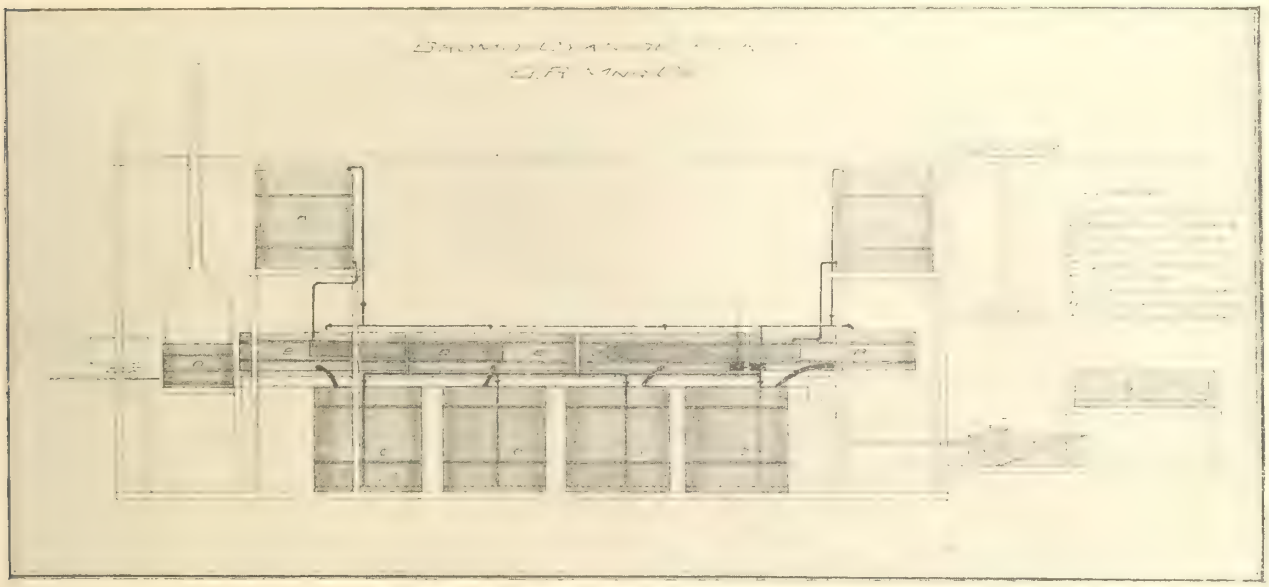
The percentage of recovery, as given above may seem low, but it must be noted that the costs are also low, and while the percentage of recovery might be increased by further treatment, it has been considered that this would not cover the increased cost.

The tailings from the cyanide treatment, which contain 40 to 50 per cent. of gangue (necessary for successful percolation) are now being reconcentrated and shipped to Germany. After this reconcentration they contain 39 to 40 per cent. arsenic and command a good price for this arsenic, and gold contents.

Experimental work, particularly some carried out by students of the Massachusett's Institute of Technology, indicate that the future method of treatment will be a combination of roasting for the recovery of the arsenic and bromo-cyanide for the extraction of the gold. Probably this work will be somewhat along the lines of the method used with such good results at Deloro, Ont.

It can be seen by a glance at the sketch of this plant that the construction is simple in the extreme.

The total cost of erecting such a plant would be about $1,000, exclusive of grading or boiler power.



The four tanks are capable of treating all the concentrates in the tailings from the 60 stamps, this ore carrying from two to three per cent of concentrates.

It is hoped that other gold mining companies in Nova Scotia may be induced to adopt some similar measures to save the gold now being lost in the tailings from their stamp mills.

| COST | | |

THE ORIGIN OF BOMBSHELL ORE.

BY H. M. CHANCE.

The term "bombshell" ore is applied by miners and iron-masters to hollow masses of limonite—brown hematite—which sometimes are round or oval, but more commonly are of any irregular shape. The "bombs" may contain water, clay, sand, quartz, flint, pyrite, siderite, sandstone or decomposed slate, or may be entirely empty. Geologists usually speak of such ore as nodular or concretionary. A careful examination of the literature of ore deposits, and especially of that relating to the genesis of limonite ores, fails to disclose a satisfactory explanation of its origin or mode of formation. By many it is assumed to be similar in origin to silicious geodes, which are supposed to be formed by the deposition of silica or silicates upon the walls of cavities, while others describe it as of "concretionary" origin without attempting to explain the process of formation or the manner in which it has occluded the variety of materials which are found in the interior of different specimens from the same locality. That it is not of concretionary origin is evident upon even cursory consideration, for concretions are masses of material arranged in concentric layers around a central nucleus. The latter may be a grain of sand, a pebble, fossil, or any substance around which (as a core) the concretion forms, growing from the center by the successive addition of concentric rings. Concretions are perhaps merely symmetrical segregations.

The peculiarities of this ore are well described by Professor T. C. Hopkins, *Bull. Geol. Soc. Am.*, 1890, Vol. II., p. 477, etc., as follows:

"Nodular ore consists of irregularly rounded masses, varying in size from a fraction of a pound to several hundred pounds in weight. The masses are frequently hollow, but some enclose a rounded or sub-angular rock fragment, which is sometimes sandstone, . . . sometimes chert, sometimes slate, and sometimes clay. Some shells are filled with clay and sand, and workmen report finding many of them filled with water. Some are filled with clay, which still retains the laminated structure and appearance of the original slate from which the clay was derived; furthermore, the slatey structure was found to extend through the ore shell, which showed, besides the plain lamination of slate, a faint concentric structure as well. . . . While only one shell was found still retaining the laminations of the clay, there were many others containing clay and sand. Some of the shells were but thin crusts, while others were quite thick, almost solid; some have a smooth, velvety or bright mammillated inner surface, frequently coated with manganese oxide. In some instances the lining of the shell is covered with many small stalactites of ore. . . . Many of the shells are lined with a dense fibrous layer, often an inch or more in thickness. . . . The thinner shells have all been broken, and we see only the fragments of them in the clay-ore masses. This shell form of ore . . . forms an appreciable part of the ore body in many cases. The small, irregular, nodular-like pieces of ore, commonly known as shot ore, are presumably closely related in origin to the shells. . . ."

The inner wall of many bombs consists of a hard, bright brown or jet-black glazed surface, carved, rounded or botryoidal. This is frequently described as a manganese coating, but is doubtless a film of iron or manganese silicate. Occasionally the interior or a part of the interior is lined with a layer of extremely hard, flinty, liver-colored iron silicate, or with quartz crystals or chalcedony, and the same silicate frequently forms a considerable portion of the body of the shell or of its outer layers, but generally the shell is composed of high-grade limonite, of a fibrous structure, especially in those layers forming the inner lining of the shell.

These peculiarities are satisfactorily accounted for neither by the theory that these ore masses owe their origin to concretionary action, nor by that which assumes the direct deposition of ferric hydrate upon the interior of rock (limestone?) cavities. They may, however, be explained by assuming that the bombs are the residual masses, remaining after oxidation, of iron sulphides or carbonates containing sand or clay or both in varying proportions.

If the material from which this ore is formed consists of sandstone, or of sandy slate, or of clay slate, impregnated more or less completely with pyrite or siderite, the formation of bombshells, containing just such materials as are found in these shells, may be readily explained, especially if the iron impregnation be in the form of pyrite or marcasite, that is, FeS_2.

If such sandstone or slate is broken and fissured by faulting and crushing, and by the development of cleavage planes, oxidation by percolating waters will proceed along the joints or planes which form the channels through which these waters circulate, and in each fragment of the mineralized rock oxidation will commence upon the outside and progress towards the center.

In this way an outer skin or shell of limonite first forms on the outside of the fragment, for if the iron be present as pyrite or marcasite, while some of it may be removed as ferrous sulphate, this salt, if formed, may immediately be oxidized and precipitated *in situ* as ferric hydrate. The sulphuric acid formed by the oxidation of the remaining molecule of sulphur will attack and decompose the clay of the gangue, removing the bases as sulphates in solution; the silicic acid also escaping in solution, or combining with iron oxides to form iron silicates, remains as an integral part of the ore.

If clay be present in large quantity a portion will remain undecomposed in the center of the bomb, together with all of the sand originally present in the gangue.

Hence, if the original pyritic material has a clayey (slate) gangue, bombs may form containing no residual matter, or containing more or less clay; if the gangue be sand and clay (arenaceous slate), the sand only, or sand and clay may remain; if the gangue be sand only, some of this will remin as an impurity in the limonite forming the body of the shell, and some as a partial filling of the interior of the bomb.

It is now well known that pyrite (or marcasite) oxidizing underground, whether by waters carrying free oxygen, or by waters containing no uncombined oxygen, or by reactions involving hydrolysis, does not behave in the same way as when oxidized by exposure to the air above ground. One of the most common reactions above ground is that in which sulphur is set free, often written:

$$FeS_2 + 4O = FeSO_4 + S.$$

but this rarely occurs beneath the surface, for the gossans of pyritic veins seldom carry free sulphur, although there are a few noted examples in which large deposits of sulphur are found between the surface and the unoxidized portions of such veins.

In the absence of oxygen, carbonates in solution may, as shown by Dr. N. H. Stokes, completely oxidize the iron of pyrite or marcasite thus:

$$8FeS_2+15Na_2CO_3=4Fe_2O_3+14Na_2S+Na_2S_2O_3+15CO_2,$$

and under proper conditions of temperature and pressure the ferric oxide thus formed may be deposited as hydrate; but these reactions do not satisfy the observed conditions, and it seems more probable that oxidation near the surface has proceeded as indicated by some of the following reactions:

$$FeS_2+H_2O+7O=FeSO_4+H_2SO_4;$$
$$3FeS_2+8H_2O+22O=Fe_2O_3,\ 3H_2O+FeSO_4+5H_2SO_4;$$
$$2FeSO_4+5H_2O+O=Fe_2O_3,\ 3H_2O+2H_2SO_4;$$
$$2FeS_2+7H_2O+15O=Fe_2O_3,\ 3H_2O+4H_2SO_4;$$
$$2FeS_2+4H_2O+15O=Fe_2O_3+OH_2SO_4;$$
$$2FeSO_4+2H_2O+O=Fe_2O_3+2H_2SO_4;$$
$$6FeSO_4+3O=Fe_2O_3+2Fe_2(SO_4)_3;$$
$$6FeSO_4+3H_2O+3O=Fe_2O_3,\ 3H_2O+2Fe_2(SO_4)_3;$$
$$2Fe_2(SO_4)_3+2FeS_2+4H_2O+12O=6FeSO_4+4H_2SO_4.$$

The sulphuric acid having been formed in direct contact with the gangue, it is reasonable to suppose that it must at once attack any clay or other decomposable material, and the removal of the soluble silicates and silicic acid by transfusion through the walls of the bomb is readily pictured. It is, however, possible that the colloidal silicic acid may be retained, and further, that it may perhaps often be set free in a gelatinous condition. This latter hypothesis may account for the frequent presence in such ores of a skeleton of amorphous silica which appears to completely ramify some parts of the limonite.

If the oxidation proceed according to these equations, the successive additions of layers of limonite to the interior of the shells is doubtless due to the further oxidation of the ferrous sulphate as above shown, the oxidation of the solution occurring at or in the wall of the shell where the solutions, in escaping by transfusion through the walls of the shell, are met by oxidizing waters transfusing towards the center of the shell. Under such conditions the ferric hydrate would be deposited in the pores of the shell or upon its inner surface.

In attempting to picture these reactions and their results, it is important to remember the extremely slow rate at which oxidation proceeds under such conditions. Even at the surface, where decomposition is comparatively rapid, the oxidation of pyrite appears to progress at a very slow rate, perhaps not exceeding an inch or a few inches in depth in several hundred years.

If the iron be present as carbonate, a precisely similar series of reactions may be conceived, in which carbonic acid transposes the silicates, freeing silicic acid and removing the bases as soluble carbonates.

Other observers have noted the occasional presence of a central core of siderite or pyrite in bombshell ore, but have generally attributed the presence of such cores to concretionary action and replacement by sulphates (accompanied by reduction to sulphide) or carbonates in solution.

The foregoing theory, advanced to account for the origin of bombshell ore, is based upon a study of these deposits dating back to 1885—when the writer was personally engaged in mining brown hematite ore—and upon examinations of many specimens which show more or less clearly the character of the original material from which such ore is formed. It will form an integral part of a broader statement, extending the application of this theory to the genesis of limonite ores, and including a discussion of the original sources of the iron, methods of mineralization, and subsequent decomposition and precipitation.

EXCHANGES.

The Engineering and Mining Journal, July 25, 1908.—James Ralph Finlay contributes to this number an article on the "Cost of Producing the World's Supply of Copper."

At the Wallaroo and Moonta mines of South Australia the present cost of mining, concentrating and smelting a ton of concentrates is about $35 per ton. The vein matter of each mine contains from 3 to 4 per cent. copper, the concentrates from 11 to 20 per cent. The veins are fissure veins in metamorphic schist and prophyry.

The only important copper mine in the United States east of Lake Superior is that owned by the Tennessee Copper Company, where large leases of copper-bearing pyrites are worked. Fuel and transportation are cheap, but all the ore has to be smelted. The ore yields only 32½ pounds copper per ton. The current operating costs for 1907 were:

Mining	$1.22
Smelting	2.14
Administration	0.49
Total	$3.85

To this should be added, according to Mr. Finlay, 21 cents per ton for the use of the mining plant, and 47 cents per ton for the use of the railroad and the smelting plant. These items bring the total up to $4.53. On this basis anything received above 12 cents per pound for copper in New York is applicable to dividends and anything above 14 cents is net profit after allowing for return with interest of money invested in the plant. These costs are from 5 to 10 per cent. higher than the average.

The Utah Consolidated Company mines and smelts ore averaging by actual recovery, 60 pounds copper, 1.33 ounce silver, and 0.104 ounce gold per ton. The total metallic extraction is equal to 80 pounds copper at 14 cents. The total cost per ton is $5.88 per ton of ore. Everything above 6.75 cents per pound for copper goes to stockholders as dividends.

At Mount Lyell, Tasmania, the total cost per ton of ore is $5.52.

At the Granby Consolidated, British Columbia, the corresponding figure is $5.75.

The article concludes with some valuable general considerations, including comparisons of disseminated

ores, quartz-pyrite ores, and ores that must be smelted in bulk.

The Mining World, August 1, 1908.—"Some Striking Features of Rand Gold Production" is the title of an article by Ralph Stokes.

From the year 1887 up to the end of June, 1908, the Transvaal has produced gold to the value of $1,000,000,000. Despite labor troubles the production of the Transvaal is increasing steadily. Before the war the maximum annual production was $80,000,000. The yield for the first six months of 1908 exceeds $68,000,000 for the Rand only. This, Mr. Stokes remarks, is the more striking in the light of the gradual diminution of the ore's grade.

Kaffir labor is replacing Chinese. The exorbitant wages of white miners are being reduced. So also are contract rates. Everywhere "cost sheets" are revealing the results of stringent economy. The Robinson Company, under American management and ununder the control of Messrs. Wernher, Beit and Eckstein, is quoted as an outstanding example of the benefits of rigid reduction of costs. Here the total working costs have been carried down to $3 per ton. The attainment of this figure throws an enormous body of ore, formerly unprofitable, into the category of payable ore.

Since January, 1888, the Robinson has paid $29,939,000 in dividends.

The Colliery Guardian, July 24, 1908.—A special contributor discusses in this issue the efforts made by British workmen to obtain compensation under the Workmen's Compensation Acts in respects of injuries caused by the acts of fellow workmen during the employment, but which have no relation to that employment. Several instances are cited where workmen were injured through practical jokes. In one case a workman was hoisted fifty feet in the air by means of the hook of a crane passed through his necktie. The man fell to the ground and was crippled for life. In this and similar cases attempts to establish the liability of employers have failed.

The Iron and Coal Trades Review, July 24, 1908.—The increasing use of mechanical coal cutters in British collieries is the subject of editorial notice in this number of the Review. In 1906 only 1,133 machines were at work. During the year 1907 the number added was 360, making a total of 1,493. This is by far the largest number added in any one year.

However, out of Great Britain's total output of 267,828,000 tons of coal, only 12,877,000 tons were cut by machine. Hence the movement has yet far to go.

Compressed air is more largely employed as motive power than is electricity. The average quantity of coal cut per machine in 1907 was 8,625 tons, as compared with 9,004 tons in 1906.

Electrolysis of pipes is now prevented by insulating from the ground. The pipes are covered with a specially-prepared asbestos paper, coated with a waterproof insulating compound, and joints are made tight by strips and insulating cement. The protection is claimed to be permanently durable.

PERSONAL AND GENERAL.

Mr. John E. Hardman recently reported upon several copper deposits on the north shore of Georgian Bay.

Mr. Fraser Reid, superintendent of the Coniagas concentrator, has returned to Cobalt after a brief honeymoon.

Mr. Hiram W. Hixon, late general manager of the Rand Nickel Company, is spending the summer at Fairbanks Lake, near Sudbury.

Mr. J. B. Tyrrell, the well known Toronto mining engineer, left on August 13th for Saskatchewan. Mr. Tyrrell will return about September 1st.

Mr. W. F. C. Parsons, mining engineer to the Londonderry Iron and Mining Company, Londonderry, N. S., is examining the Bathurst, N.B., deposits for the Drummond interests. Mr. Parsons will also make a professional visit to Mayo, Ont.

Mr. Alexander H. Smith, general manager of Los Reyes Gold Mining and Milling Company, Oaxaca, Mexico, is in Toronto. Mr. Smith has recently visited the copper mines of the Lake Superior region. He is returning shortly to Mexico.

Dr. Henry Youle Hind, who died at Windsor, Nova Scotia, on August 9th, was the author of the following publications: "Prize Essay on Insects and Diseases Injurious to the Wheat Crops," 1857; "Narrative of the Canadian Red River Exploring Expedition of 1857, and of the Assiniboine and Saskatchewan Exploring Expedition of 1858," 1860; "Explorations into the Interior of Labrador Peninsula," 1863; "Eighty Years' Progress of North America"; "Notes on the Northern Labrador Fishing Ground," 1876; "The Effect of the Fishery Clauses of the Treaty of Washington on the Fisheries and Fishermen of British North America," 1877; "Sketch of the Old Parish Burying Ground, Windsor, N.S.," 1889; "History of the University of King's College, Windsor, N.S.," 1890. The degree of M. A. was conferred on him by Trinity University in 1853; and the degree of D. C. L. was granted to him by King's College, Windsor, of which college he was for many years a Governor, in 1890.

CORRESPONDENCE.

To the Editor

"Canadian Mining Journal."

Dear Sir.—

The clipping* which I send you doubtless refers to the special representative's work who was sent to Canada by our president. I will be indebted to you for an outline of your Canadian Act on the subject of compulsory arbitration. Please give same in your Journal.

I have had considerable experience with labor, especially with coal miners, and have had charge of mines in various parts of the United States and Canada. Some of the middle western coal mining States, e. g., Illinois and Indiana, formerly had State Boards of Arbitration. The services of these Boards were merely conciliatory, and neither party to the controversy was required to abide by their decision. Yet these Boards rendered good service. I do not believe compulsory

* See page 398.

arbitration would be of service in the States, even if it could be made constitutional.

In your columns I note frequently reference to labor troubles among coal miners. Recently I read of a strike at Michel resulting from the refusal of a superintendent to employ an objectional miner. This cause rarely leads to troubles over here as the unions (I refer to the U. M. W. of A. more particularly) generally recognize the superintendent's right to employ or to refuse to employ any man. From my observations in Cobalt I rather doubt the efficiency of your law on compulsory arbitration.

Kindly give an outline of your law and comments on the same in your journal.

Very truly yours,

American Coal Mine Manager.

[Editor's Note.—This is the clipping referred to by our correspondent. We shall publish some comments on the Industrial Disputes Act in an early number.]

Editor Canadian Mining Journal, Toronto, Ont.:

Dear Sir,—Will you please insert the following correction: In several newspapers last week, and now in the Engineering and Mining Journal, there is a statement concerning placer gold in the Larder Lake district. "Professor Willmott" is quoted as the authority. I wish to state that so far as I am concerned I have never been at Larder Lake and made no report to anyone on placer gold in that region. Yours truly,

A. B. WILLMOTT.

Sault Ste. Marie, Ont., August 11, 1908.

INDUSTRIAL SECTION.

Bulletin No. 16, The Jeffery A-5 Electric Rotary Drill.—This machine is designed on essentially new lines for heavier work than it is usual to attempt with electric rotary drills. For drilling coal, slate, rock salt, clay, gypsum and other soft material it possesses distinctive features. The motor, entirely enclosed in a damp and flame-proof casing, furnishes ample power. Changes in speeds and rates of feed are quickly and easily effected. A friction release checks the forward movement in case excessive resistance is encountered and makes possible the drilling of harder material than is practicable with a positive feed. The drill is easily handled and set in position. Special auger bits are provided.

Jeffrey Bulletin, No. 25.—Handling Coal and Ores.—A well illustrated catalogue showing engravings and sections of steel tipples, roller shaking screens and loading chutes.

Compressed Air Appliances and Uses of Compressed Air.—Canadian Rand Company, Limited, Montreal.—The Canadian Rand Company has designed air power machinery for the past twenty years. The pamphlet before us embodies in crisp form the results of the company's experience in designing and manufacturing compressed air appliances. In the machine shop, in the foundry, in the boiler shop, in structural steel work, the uses of compressed air are too numerous to mention. The air-lift system of pumping artesian wells by means of compressed air is superseding the old deep well pump. In many industries, such as tanning, stone work, etc., modern conditions demand its use. For house cleaning, car cleaning, etc., compressed air is now considered indispensable.

This recently issued catalogue presents illustrated descriptions of air hoist valves, air hoists, Rand trolleys, Rand jib cranes, compressed air elevators, hydropneumatic elevators, compressed air jacks, pneumatic rams, broaching hammers, blacksmiths' air hammers, "Imperial" pneumatic tools, "Imperial" motor hoists, jaw riveters, injector sand blast, air compressors and Rand rock drills.

The "New Slugger" rock drill marks a departure in design. The valve is of the piston variety with a movement of only a fraction of an inch. It strikes an uncushioned blow and operates with a variable stroke. By cranking the drill up close to the rock, or back from the rock, the stroke may be varied from one-half inch up to the full stroke of the machine. This variable stroke is of special advantage when spotting a hole in a glancing place, or to enable the drill to free itself in close quarters, or in case the steel is a little too long.

The Rand Class "C" portable self-contained air compressor is worthy of especial note. It is designed for prospecting, mining or general operations on undeveloped or difficultly accessible properties where a large outlay of money is not warranted.

Bulletin No. 40 "Cleveland" Stope Drills.—The Cleveland Pneumatic Tool Company, Cleveland, Ohio.—The first inside page of this bulletin is noteworthy. On it is printed a half-tone of a well known mine-manager of Cobalt operating a "Cleveland" No. 40 hammer drill.

The pamphlet, alluding to the small amount of power necessary to run the No. 40 hammer drills, points out that a gasoline engine and small compressor, capable of supplying power to one 2¾-inch reciprocating drill, will run two or three No. 40's.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay (August 3).

Output of the Dominion Coal Company's mines for July, 1908:

No. 1	51,782
No. 2	66,845
No. 3	39,507
No. 4	41,936
No. 5	49,827
No. 6	24,073
No. 7	17,435
No. 8	23,646
No. 9	29,871
No. 10	19,751
	364,673

After a great deal of hard work and patient investigation the arbitrators appointed to act on the Board on Conciliation between the employees of the Nova Scotia Steel Company and that company have arranged a satisfactory settlement between the parties to the dispute. The following statement, which was officially issued to the press, will explain the nature of the settlement:

On Saturday a settlement was reached in the matter of the dispute between the Nova Scotia Steel and Coal Company and its employees in the colliery department.

Much evidence was taken on behalf of the men, and the company, and the matters at issue were discussed in all their bearings. Every opportunity was afforded the parties of reaching a mutually satisfactory agreement. In the end the Board of Conciliation formulated a basis of settlement which involved an adjustment of rates as between the higher and lower scales of remuneration, though a great difference would still remain. This adjustment involved a moderate reduction on some of the higher paid work in No. 3 colliery, and an increase in the wages paid to certain grades of lay labor through the collieries, and also an increase in pay for the less remunerative mining in No. 1 colliery. The increase in wages is considerably more than the decrease and the difference is supplied by the company.

The award of the board was referred to the various lodges on Friday evening, and on Saturday morning the sub-council of the P. W. A. met at the town hall of Sydney Mines to receive the reports of the delegates from the lodges and to take final action on the award of the Board. It is understood that the representatives of No. 3 mine were opposed to the reduction of their scale of rates, but by a large majority, the sub-council voted to accept the award of the Board.

The company having also agreed to the award it was signed by the representatives of both parties. Mr. T. J. Brown signing on behalf of the company, and Messrs. Moffatt, Galagher, McLachlan and Dorsay on behalf of the men, while Prof. Shortt and J. W. Maddin also signed as members of the Board of Conciliation.

By the terms of the agreement the previous rates in No. 3 are reduced as follows: For machine men, one-half cent per ton; for shot-firers, one cent per ton, and for narrow works, five cents per ton. These reductions will amount to $550 per month, to which the company agree to add $300 per month. The total of $850 per month, or $10,200 per annum, will be devoted first to increasing the wages of day laborers from $1.38 to $1.45. Second to increasing the scale of payment for falling stone in No. 1 mine. The new rates take effect from August 1st.

It will be seen that the settlement has been come to along similar lines to that arranged under the same chairmanship between the workmen and the management of the Dominion Coal Company in March of this year, namely, an increase to the low paid men and a slight reduction in the wages of some admittedly highly paid workmen. This same extraordinary gap between the wages of men working side by side has for many years operated very disadvantageously on the labor situation in the Cape Breton collieries. The Conciliation Boards are doing very good work in Nova Scotia. Where the matters in dispute are of serious moment, affecting large numbers of men and communities the method of conciliation afforded by the working of the Lemieux Act is proving to be a very beneficent one, but where the matters are trivial it can easily be seen that the constant appointment of such boards will prove a vexatious proceeding, if carried to unreasonable limits. If the law is administered with sound judgment, limiting its application strictly to cases where its operation is necessary, we shall have the working basis of arbitrational legislation applied to labor and wages disputes that will make Canada a land of freedom from strikes. If this can be achieved we shall have gained a point in the industrial game which will considerably advantage us against our southern neighbors. We rather think that the submission of the men's case by a native labor union before a tribunal impartially constituted under a Canadian law has resulted in better things than would have resulted from the efforts of a foreign labor organization, deprived of that subtle force of public sympathy whose effect it is hard to estimate. Public opinion is something that no corporation, however arrogant, and no labor union, however aggressive, can afford to ignore, and there can be no doubt that public opinion would be utterly against the workings of any labor organization that were engineered from across the border, should trouble arise as a consequence.

The mines of the Dominion Coal Company produced their record output in July, namely, 368,000 tons, which is 18,000 tons more than the previous record, this being the 350,000 tons obtained in October, 1906. This large output was obtained in spite of the fact that the delays experienced were more than the ordinary ones. The output might easily have been 12,000 tons more than it actually was. Nos. 2 and 9 were considerably delayed by the falling of the coal hoisting cage from the top to the bottom of the shaft in the Harbor side, which delayed No. 2 for two days and No. 9 for four days. Up to the end of July the outputs are about 330,000 tons ahead of last year, and the St. Lawrence shipments are about a quarter of a million tons in advance of those of 1907 at this period. When it is remembered that the output of 368,000 tons has been produced on single shift it will be seen how large the capacity of the coal company's mines has become.

The news of the Fernie conflagration has been received here with regret approaching consternation, as so many natives of Nova Scotia are out in the Crow's Pass district. The Cape Breton miner bears the same relation to the Dominion that the Cornish miner bears to the Empire as a whole. He is as ubiquitous as the Nova Scotia seaman. In the Yukon, the Cobalt and the Kootenay one can find the man from "Cape Breton over," and when the early history of Canadian mining comes to be written there will be a fair sprinkling of those Highland names peculiar to Cape Breton.

Sydney.

Mr. E. J. Foster, vice-president of the Great Bras D'Or Gold Mining Company of Middle River, Cape Breton, reports that his company is making satisfactory progress with the development of their mines. The stamp mill is giving pleasing results.

Between the Lizard vein and the footwall a 4-inch vein of nickel-copper ore occurs. It carries 22 per cent. copper and 17 per cent. nickel. This occurrence may prove of economic importance.

Halifax.

The vein of scheelite (calcium) tungstate, which is being opened up near Moose River, Halifax county, averages 50 per cent. tungsten trioxide as mined. It is being actively developed. Search is being carried on for other veins. The discovery is one the importance of which has scarcely been appreciated.

ONTARIO.

Cobalt.

A celebration for the benefit of the Volunteer Fire Department will be held at Cobalt on August 19th and 20th. The most elaborate programme ever attempted in this part of the country has been arranged.

On Wednesday morning, August 19th, a double hand-drilling contest will be held in Cobalt square. A prize of $200 will be given the winning team and $100 to the second. Aquatic sports will be held on Cobalt lake, and in the afternoon a firemans and miners' parade, to be followed by a ball game in Cobalt's new park. Thursday there will be boat, canoe, pointer and swimming races on the lake, and a second ball game in the afternoon. Over $2,000 will be given in prizes. Arrangements have been made with the railroads for special rates from all points.

BRITISH COLUMBIA.

Fernie.

The total loss of the Crow's Nest Pass Company in the recent fire amounts to about $200,000. Very little of the mining plant was damaged. Neither Coal Creek nor Michel was touched by the flames. The timber lands destroyed were valued roughly at $1,000,000. This asset, however, did not appear in the balance sheet of the company and the loss does not affect directly the affairs of the corporation. During the week of the fire the company produced 6,000 tons of coal. Production of both coal and coke will be back at normal figures as soon as sufficient workmen have returned.

A new steel tipple is under construction at Michel and fifty new coke ovens are being built at Fernie and Michel.

The damage done at Hosmer will not delay the commencement of coal and coke shipments in December next. Only ten miners' cottages out of seventy-three were burned. The tipple and trestle are both intact. Two weeks will suffice to clean out the tunnels. The office, bunkhouse and machinery house are undamaged.

Rossland (August).

The mines of this camp continue to produce over 5,000 tons of good ore per week with regularity. The ore is showing up as well as could be expected at depth, especially in the workings of the Consolidated Company's mines, where the main shaft is down on the Centre Star claim over 2,200 feet. Some of the ore taken from the War Eagle-Iron Mask section of this company's property has shown an average value of $31 per ton, which is $18 to $20 higher in value than the average gold-copper ore of this vicinity. The company shipped 2,132 tons of this ore to their smelter at Trail which returned the mine over $27 per ton. Ore of this character is a valuable asset to a mining company in a low-grade belt and comes as a kind of "find," as under existing conditions it costs no more to handle than $10 or $12 ore.

Work is being continued on the small properties around the city and every now and then one of the small mines appears on the shipping list as having sent out a car or two of picked ore. During the week ending July 25th the Sunset was added to the shipping list, the 25-ton car sent out being the first shipment made from the mine for several years.

Things are quite busy about the Trail and Northport smelters and it looks as though business at these places would improve ere long.

The Le Roi 2, Ltd., continues to work ahead and lay up money for another dividend in the impending last few months of the year. The Le Roi 2, Ltd., is certainly making a good showing. A considerable quantity of prospecting work is being done on the ground of this company with an eye to the ore supply of the future. The Vancouver group of claims in the Slocan district, on which the Le Roi 2, Ltd., have expended nearly $100,000, will in future be in the hands of a London flotation known as the Van-Roi Mining Company, the capital stock of which is £34,500. The Le Roi 2, Ltd., will still hold a share in the enterprise in the form of stock.

Boundary.

The latest advice is that the Snowshoe-War Eagle group in Phoenix camp is to resume operations in a few days. This property, controlled by the Consolidated M. & S. Co. of Canada, Ltd., is a valuable copper producer and when once work is going on there then all of the large Boundary copper mines will be in working condition and this district will bear much the appearance of what it has in busy days gone by. The Consolidated Company has expended a considerable sum of money on the Snowshoe group for up-to-date machinery, development work and the acquiring of nearby claims. While the company was only able to operate about nine months of last year, owing to the shortage of coke, etc., yet they managed to mine and ship over 135,000 tons of copper-gold ore. Part of the Snowshoe ore was treated at the Greenwood smelter last year owing to the fact that this smelter was nearer at hand than the company's own smelter at Trail, where but a portion of the output was treated, but it is understood that a majority of this ore will go to Trail when work is commenced, where the ore is desirable as a flux for the "wet" ore received at that point.

The Granby Company has been mining and treating from 20,000 to 22,000 tons of ore per week right along. At this writing four of the furnaces at the Grand Forks smelter of the company are out of commission as they are being connected up to the new blower apparatus. This will, no doubt, cut down the treatment record while the improvements are going on. Owing to the fact that a disastrous fire has ravaged the Fernie district where most of the coke used by the Granby Company is made, it is likely that the supply of that commodity will fall short of the needs of the company and the supply they have on hand at Grand Forks will be used up before things can be got in good running order at the Fernie mines again. If a situation of this character should arise it would probably mean a curtailed output from the Granby mines for a short period.

The B. C. Copper Co. is making several improvements about their mines and smelters, including a new 20,000-volt sub-station to facilitate the transmission of electric power about the works, self-dumping cars, etc. The new Rand compressor is now running without a hitch and as a consequence they have an ample supply of compressed air power about the place for all requirements. An officer of the B. C. Copper Co. has stated that during June the company produced copper and laid it down in New York for 9¾c. per pound, and that during the month of July they would beat this low cost, in consequence of a larger tonnage treated at the same fixed costs. They are shipping a car of blister copper per day.

A strike of marked importance was made on the Dominion Copper Company's Brooklyn mine, Phoenix, a couple of weeks ago. The ore of the Brooklyn mine has been known to carry higher gold values than any of the other Phoenix mines and in the case of the new find the values are up to the standard for this locality. Recent assays give $4.50 in gold, 50c. silver and 2.2 per cent. copper. This ore body has been blocked out on several levels and development work is being executed further to ascertain its exact extent.

The Dominion Copper Company is not shipping what one would call heavily at the present time, but arrangements are being made to equip the two smaller furnaces at Boundary Falls with an up-to-date feed arrangement, when shipments and treatment can be raised to about 1,000 tons per day. They are shipping a quantity of $8 ore from the Athelstan and also a quantity of the Mountain Rose ore, which runs high in iron, for fluxing purposes. Regular shipments are being maintained to the smelter from the Brooklyn, Rawhide and Sunset. The big furnace is treating 650 tons per day.

The ore shipments from the Boundary district for the week ending July 25th were the heaviest that have been recorded for this district so far; 38,113 tons were sent out during the week, running the total for the year to date up to 706,185 tons.

Interest is again being revived in many of the smaller properties in this district and work has been commenced, or will shortly be resumed, on many of them, including the Skylark, Prince Henry, Tip Top, Silver Reef, etc.

Nelson.

Inquires have been made in this vicinity lately in regard to several mining companies that have been organized in this district but which have not achieved very much in the way of definite results. The Maple Leaf Mining Company which was organized here several years ago never did very much in the way of legitimate mining. The promoter, who got a number of business men and some of the clergy interested, was more interested in selling stock than in doing any work on the claim of the company and nearly got himself into trouble with San Francisco shareholders, who sent an engineer to report on the property. The report, we are informed, was not favorable.

Considerable of the stock of the erstwhile Referendum Company, now the Forty-Nine Creek Company, is knocking about the country. Now, the showing on the Referendum as a prospect was quite a promising one. The property is a free milling gold mine and some good looking ore has been taken out of the workings, but there is some doubt as to whether the work has been done in a systematic manner and whether the enterprise will prove to be a mine in the future. There is a 3-stamp mill on the ground and some likely looking gold bricks have been turned out, but taking the thing all in all we would not care to invest our money in a mine of this kind when there are far more promising propositions to be had.

The Fisher Maiden Company were to have resumed operations before this and no doubt will get down to work before long. There is said to be a good showing on this property but in the prospective stage.

It seems almost useless to advise people not to put money into mines that they know nothing about for the fact that they do it is evidenced by the great number of companies throughout this district who are selling stock and doing little or no work other than thinking up brilliant ideas for prospectuses. It would seem that the only way to protect these small investors from themselves would be for the government to adopt some plan limiting the capitalization of mining companies and providing means for seeing that the proceeds of treasury stock were spent on the property and controlling to some extent the selling of promoters' stock, then the investor would know that the money he had paid for treasury stock held by him had all been expended on development and that an effort had at least been made to make his stock more valuable, and the prospect into which he had bought, a mine.

Rossland (July).

The Rossland mines made good headway during the last six weeks and all of the large mines made a good profit on their operations for the month of June. The ore bodies in the lower levels of the Le Roi are developing in good shape and the erstwhile premier mine of the camp is steadily making money. At the Centre Star mines, now the heaviest shipper in Rossland camp, a large amount of $40 ore is still being taken out besides 3,500 to 4,000 tons of average grade ore per week. These mines are now making more money for the Consolidated Company than any of their other holdings. The Consolidated Company has done much for the development of the ore bodies of the southwest side of Red Mountain and at that they have only begun to work. There are large areas in their holdings which have not been explored at all yet and which will not be, even though they are steadily extending their operations, for many years to come. Mining men here expect to see a good annual report from the Consolidated Company for the past fiscal year's work.

Diamond drill exploration still continues on the property of the Le Roi Two, Limited, and the lower levels of this mine look better now than they have ever before; that is, as far as future prospects go. In order to maintain their reputation as Rossland's steady dividend paying mine this company has declared another interim dividend of two shillings per share, paid July 8th. This totals four shillings per share already paid by the Le Roi Two this year, two shillings having been paid to the stockholders in March last. The Le Roi Two, Ltd., is a valuable asset to Rossland camp and it looks as though they would soon be in a position to pay these regular dividends for a good many years yet, the way the ore is coming in at the lower levels.

The work of the lessees hereabouts continues and some good results have been achieved. During the last couple of weeks the Curlew sent out a 30-ton car of good grade ore and the lessees of the Blue Bird shipped a 35-ton car of partly oxidized ore, which is expected to carry exceptionally high values for this district.

The Trail smelter is receiving 6,500 tons of ore per week from Rossland and Slocan districts, about 150 tons per week from the First Thought in Washington and 1,000 tons from the Snow storm in Idaho.

The mining outlook here for this fall is very bright, and as everyone expects copper to go a little higher in the next few months the Rossland mines will no doubt make good profits for the balance of the calendar year.

Boundary.

Things are beginning to look like the good old busy days in the Boundary district. The Granby Company is working away steadily and every day making some improvement in its working plant that will cut down the operating expense. The same may be said of the B. C. Copper Company.

At the Dominion Copper Company mines they have got down to shipping, but the shipments are not as heavy as they will be a little later on, when several important improvements have been made. The big furnace at the Boundary Falls smelter is treating about 650 tons of ore per day, but it is planned to put the two smaller ones in commission as soon as they can be equipped with electric feed, the same as the big one and most of the furnaces now used in this district.

Good news is heard from the Brooklyn property of the Dominion Copper Company, where they have opened up a big new ore body. The values and full extent of this find have not been ascertained at the time of this writing, but it is stated that this lode will have an important bearing on future work at the Brooklyn.

The ore shipments from this district for the week ending July 18th and for the year to date were as follows :

	Week, Tons.	Year, Tons.
Granby Mines	21,744	582,488
Mother Lode (B. C. C. Co.)	8,901	58,015
Oro Denoro (B. C. C. Co.)	2,912	18,558
Brooklyn (D. C. Co.)	1,050	2,220
Rawhide (D. C. Co.)	1,710	4,570
Sunset (D. C. Co.)	576	1,608
Mountain Rose	50	110
Sally	..	80
Crescent	..	50
Snowshoe	..	367

The week's shipments mentioned above were a record lot for this district. The Granby smelter at Grand Forks treated 21,820 tons of ore during the week; the B. C. copper smelter at Greenwood, 13,143 tons, and the Dominion copper smelter at Boundary Falls, 3,625 tons.

As stated above the Dominion Copper Company are fitting up their two small furnaces with electric feed and are to build a 1,200-foot tramway from the Idaho to the Stemwinder to facilitate the handling of ore and reduce the cost of production.

Distinguished visitors to the Boundary from the business centers of the country all express the opinion that conditions will so shape themselves within the next few months that copper will rise to a point near a normal figure. It looks as though the gradually increasing consumption and other factors would bring about this result in the next few months. When the red metal does advance a few cents the copper mines of the Boundary are going to make big profits as they are to-day working on a rock bottom economical basis and many little forms of extravagance that are often overlooked when times are prosperous have been cut off and the little leaks stopped. It is stated that the Granby Company are making copper for between eight and nine cents per pound and at the rate of 30,000,000 pounds per annum.

The work of making a geological survey of Phoenix camp is now under way; the work has begun at the Gold Drop-Snowshoe claims. No doubt this work will prove as valuable to the miners of Phoenix as it has done to those of other districts where surveys have been made.

The stamp mill on the Golden Zone has been completed and will soon be in operation. As is the case in Rossland, Nelson and Ymir districts, in the Similkameen, more development work is being done this year than has been the case for some time past. No extensive development is going on in the Ollala section with the exception of at the Bullion where seven men are at work on active development.

Nelson.

Mr. James Cronin, formerly managing director of the St. Eugene and associates, have disposed of the Canadian Girl and the Yankee Girl claims in the Ymir district to H. L. Rogers, of Spokane, representing eastern capital. The consideration is $40,000. Work has been commenced on the property, which is a silver-lead prospect of merit and appears to have a promising future.

The Ymir Mining Company is going to spend $30,000 in development work and improvements about the Premier mine of Ymir district. Having recovered the main ore body the outlook for the Ymir is better than it has been for four or five years.

A visitor to Nelson this week says that a record quantity of gold is now passing through the Assay Office at Vancouver. The staff is working overtime and on holidays, and a recent shipment of gold received from the north was valued at over a quarter of a million dollars. It is presumed that the recent trouble at the assay office in Seattle has diverted some of the trade that used to go to that institution to the Vancouver office.

At the Vancouver mine, Slocan, operated by the Le Roi 2, Limited, they are installing the first half of a twenty-drill Rand compressor.

The Blue Bell mill is making concentrates at the rate of a barge load per week. The handling of the concentrates is made an economical process by dumping them directly from the cars to the barge in bulk. Just now the zinc in the Blue Bell ore is not being saved, but negotiations are under way for the installation of a magnetic plant to accomplish this. The Hewitt Mining Company have organized. Their head office is Wilmington, Del., and they will have a branch at Nelson. The Hewitt Company are successfully operating the Hewitt and other properties at Silverton.

The International Coal and Coke Company will deduct three-quarters of 1 per cent. from their regular quarterly dividend of 2 per cent., payable August 1st, which is to be applied to their outstanding bonded indebtedness of $200,000, so the shareholders will only receive a dividend of 1¼ per cent. this time. The company is steadily producing 2,000 tons of coal per day.

GENERAL MINING NEWS.

NOVA SCOTIA.

[**Editor's Note.**—The following is a press despatch. It will come as exceedingly bad news to those interested in Nova Scotia gold mines. Until further particulars appear it is impossible to size up the situation. It may be stated, however, that the financial difficulty that has crippled the company, does not indicate that the mine is exhausted. In our next issue we intend to demonstrate that this is an excellent opportunity for the Government of Nova Scotia to step in and put the mine once again in operation.]

Halifax.—The Boston Richardson mine at Goldboro, the largest gold mine in Nova Scotia, has gone into liquidation and is now in the hands of a receiver. An application was made to the Supreme Court to-day for an order appointing a receiver, and after hearing counsel, the judge to whom the application was made granted an order appointing the Eastern Trust Company. An expert, representing the receiver, will leave to-day for the mine, where he will make a thorough and complete investigation of the mine and its potentialities. His report will be submitted to the court in order that further instructions may be given to the receiver.

The collapse of the Richardson mine means heavy financial loss to many in Halifax, but the greater part of the mortgage bonds were held in Boston. At the present time there is about $52,000 owing by the company on current account. Besides this there is $59,000 owing on first mortgage bonds.

Of a total capitalization of over half a million, about $350,000 of consolidated mortgage bonds have been issued and sold, and those will rank after the mortgage bonds. Practically the whole of the first mortgage bonds are held in Halifax. The consolidated mortgage bonds are almost entirely held in Boston. Probably the largest holder is Franklyn Playter, the president of the company, who has lost his private fortune backing runing operations at Goldboro. Another large loser is Mr. Wallace, a prominent banker and shoe manufacturer in New Hampshire. He is a close personal friend of President Playter and invested very largely in the mine, and his loss will be heavy. Playter is president of the United Zinc Company of America.

Glace Bay.—The Dominion Coal Company's output for July was 368,000, which breaks all previous records. The next largest, 350,000, was raised during October, 1906. But for some accidents the July output would have been good for many thousand tons larger.

Glace Bay.—Through the fall of a cage at No. 9 colliery of the Dominion Coal Company's mines, work was delayed for a few days.

Springhill.—In No. 3 slope of the Cumberland Coal Company's collieries, Percy Jordan, a young negro, was crushed between the boxes and fatally injured.

ONTARIO.

Belleville.—Substantial gold discoveries are reported from the township of Elzevir, Hastings county.

Madoc.—The talc grinding mill, recently put in operation here, has sufficient orders to keep it moving for some time to come.

Cobalt.—Three miners, natives of Cape Breton, Foley, McDonald and Gillies, were suffocated by gas in French's mine at Elk Lake, on August 1st.

Cobalt.—Manager McNaughton has installed a crusher at the Tretheway. Additional machinery is to be installed. During July the Tretheway shipped 400,070 pounds of ore, seven carloads. The rumors of a coming dividend still persevere.

La Rose mine shipped more ore during July than did any other Cobalt mine. Its record was 18 cars, or 1,028,880 pounds. Nipissing came next with 13 cars, or 727,707 pounds, and O'Brien 11 cars, or 725,697 pounds.

The shipments of the camp for the month were heavier than ever before. A total of 2,584 tons was reached. This is a large increase over any previous monthly output.

Larder Lake.—While the limits of the pay zone of the Harris-Maxwell mine have not yet been determined, rich ore has been encountered in the drift, which is being driven in just above water level. A quantity of specimen gold ore has been obtained, some of which has got into dishonest hands and has been used to sell stock in other properties.

Port Arthur.—New machinery is en route to the Beaver mine. A carload of silver ore has just been shipped.

Haileybury.—The new townsite, "Sixty-Six," in South Lorrain, is being cleared and laid out. From its situation it forms an advantageous base of supplies for the new mines of the district.

Wabigoon.—Near the junction of the Lake Superior branch with the main line of the Grand Trunk Pacific, on the north shore of Vermilion Lake, is situated the mine of the Northern Pyrites Company. The shaft is down 220 feet, and a considerable amount of cross-cutting and drifting has been done.

Sudbury.—The Mond Nickel Company is developing the Garson mine rapidly. Ore is being purchased from outside producers.

Port Arthur.—Existence of a large and valuable deposit of nickel north of the Transcontinental Railway, and 100 miles west of here, is reported by T. H. Crowley, of Peterboro, a prospector, who has a long experience in all parts of Ontario. Crowley arrived in the city recently, en route home, after spending several weeks in that country, and showed a number of excellent samples. One contained both silver and free gold and he said lots of it was to be found north of Wabigoon and Sturgeon lakes. He also claimed to have uncovered at a point some distance northeast, a vein of almost pure nickel, and expressed the opinion that a large ring of it would be found to exist there.

BRITISH COLUMBIA.

Fernie.—A few days before the fire the Crow's Nest Pass Coal Company commenced the construction of fifty additional coke ovens, twenty-eight at Fernie, twenty-two at Michel.

Fernie. Twenty-four miners were entombed in the C. N. P. Coal Company's No. 2 mine, Coal Creek on July 31st at 8 a.m. Prompt measures were taken and all of the miners were rescued.

Fernie, Aug. 5.—The work of rebuilding the town of Fernie has already commenced. The new C. P. R. station is almost ready for occupation. At date of writing every man, woman and child has been provided with shelter.

Phoenix.—Work is to be resumed at the Snowshoe mine. Shipments amounting to 125,000 tons of ore were made up to the middle of last November, when the mine was closed. The reopening of the Snowshoe will mean the blowing in of another copper furnace at Trail.

Rossland.—The Sunset mine has joined the list of shippers.

Phoenix.—The Granby Consolidated has purchased the Golden Eagle claim. The reported price was $12,000.

Nelson.—The first shipment of zinc ore has been sent to the new zinc smelter.

Kaslo.—A carload of zinc ore from the Hewitt mine is being put through the plant of the Kootenay Ore Company here.

Mr. Louis Pratt is arranging to open up the Last Chance mine at Sandon.

The Silver Cup mine at Ferguson is shipping steadily. Sixty men are employed. Four stopes are being worked.

YUKON.

Dawson.—A ledge of copper ore has been discovered on Williams' Creek, 230 miles above Dawson. The vein matter is quartz and the copper-bearing minerals bornite, malachite and chalcopyrite.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The statement submitted to the shareholders of the Glamorgan Colliery Company at a recent meeting showed 40 per cent. profits on the year's transactions, in addition to paying arrears of dividends on preference stock. Another striking record of a South Wales coal company is that of the International which, during a period of ten years, has realized profits amounting to 20 per cent. per annum.

Of the total output of collieries in Great Britain last year, amounting to 267,828,000 tons, only 12,877,000 tons, or less than 5 per cent. were hewn by machinery. The use of coal-cutting machines, however, is rapidly increasing, the quantity cut in this manner showing an increase of 26 per cent. over the like output in 1906.

FRANCE.

The quantity of bauxite exported from France in 1907 was 110,915 tons, of the value of £94,000. The chief sources of supply are a few miles east of Marseilles, the deposits being the most important in the world.

RUSSIA.

The gold discovery on the lower Amascov, Siberia, from preliminary investigations is estimated to contain 230 poods, or 121,151 ounces of gold. Pits are being dug and working will be begun immediately.

NORWAY.

A shipping duty of 25 öre per ton has been placed upon all ore exported from Norway.

GERMANY.

The Bavarian Government is acquiring the Stockheim collieries, paying therefor 2,500,000 marks, and an annual rental based on a sliding scale, increasing with the output.

An investigation is being carried out by a special committee of the German Gas and Water Association on the subject of gas coals. So far twenty-eight different kinds of coal have been tested.

AUSTRALASIA.

Two seams of good coal, respectively 7 feet and 4 feet 6 inches thick, having been found on the property of the Mount Morgan Gold Mining Company, Queensland, a mine will be opened.

The Northern Federation of Miners, New South Wales, have repudiated the New Industrial Disputes Act, and declared their intention of reverting to the strike system. As strikes are illegal under the act serious complications may result.

The Queensland Government has devoted £50,000 to the encouragement of the mining industry. The Government geologist is visiting the principal mining fields of the State to ascertain how the money can best be applied.

SOUTH AFRICA.

The De Beers diamond mine at Kimberley, the largest in the group, was closed down July 31st in pursurance with the policy of the company to restrict the output and reduce expenditures until the market revives. The syndicate which markets the De Beers output have on hand a stock of uncut stones worth nearly $10,000,000.

The report of the Secretary of Mines for Rhodesia for 1907 notes steady progress in the gold mining industry, the output being 612,052 ounces valued at £2,178,886. The total crushing power in operation was equivalent to 1,488 stamps and five tube mills. The diamond yield was 4,363 carats, value £20,193.

UNITED STATES.

On July 24th the new smelter of the Tintic Smelting Company, built at a cost of about $300,000, in the Tintic mining district, Utah, was blown in.

High grading, which is said to prevail to a greater extent at Goldfield, Nev., than in any other mining camp, resulted in the fatal wounding of one of the offenders at the Mohawk

mine, who refused to surrender when caught in the act. Another was arrested.

Gold dredging is being extensively undertaken in Calaveras county, Cal., to secure the tailings of the old-time miners, which contain much gold.

Plans are practically complete for the construction of a railroad into the Yerington copper district, Nevada, in connection with the Harriman railroad system.

The first cargo of 12,000 tons of iron ore arrived at the new plant of the United States Steel Corporation, at Gary, Ind., on July 23rd.

MEXICO.

By a Mexican law recently promulgated machinery imported into Mexico by mining syndicates and metallurgical establishments for refining the precious metals will continue exempt from import duty until June 30, 1909.

The proposed anti-foreign mining legislation has been referred by the Cabinet to President Diaz, who is given authority to accept and enforce or to reject the measure.

CHILI.

The consumption of coal has increased very rapidly in the last five years, the gain in that period amounting to nearly 300 per cent. An effort is being made to develop the very extensive coal fields of the Province of Aranco, south of Coronel.

COMPANY NOTES.

The Tretheway Silver-Cobalt Mine, Limited, has declared a 5 per cent. interim dividend, payable on September 1, 1908.

The Mond Nickel Company has made remarkable progress recently and further evidence of its prosperity is given by the dividend declared last month. The distribution on the ordinary shares, which a year ago was 12½ per cent. is increased this time to 15 per cent., while the deferred shareholders will receive 48, as against 33 per cent. At the same time £25,000 is placed to reserve, as compared with £20,000, and the balance carried forward is £11,600 larger than last year, amounting to £29,900. Considering that the first dividend on the ordinary shares were declared only three years ago, and that two years before then the preference interest was not fully earned, the progress made since the initial difficulties were overcome has been astonishingly rapid.

The high price of copper has been of great help during the past financial year, but the low price now ruling must reduce the profits. The Mond process converts all of the copper into sulphate of copper, which is largely used for the manufacture of paris green by mixing with arsenic. It is claimed for the Mond nickel that it is the purest of any offered to consumers.

The directors of the Crow's Nest Pass Coal Company have authorized the rebuilding of the parts of the plant destroyed by fire at Fernie. Although no fixed appropriation was made, it is estimated that the net cost to the company of the rebuilding and refitting will be in the neighborhood of $50,000. The fire destroyed the hospital, and did considerable damage to the coke oven plant and other equipment, the total loss being placed at about $200,000. There was about $150,000 insurance held on the plant. The work of rebuilding will be started immediately.

COBALT DIVIDENDS.

July dividend payers are as follows:

Nipissing (regular 3 per cent. quarterly)	$180,000.00
McKinley-Darragh (interim 3 per cent. and 2 per cent. bonus)	112,346.85
Kerr Lake (regular 2 per cent. and regular 1 per cent. bonus)	90,000.00
Crown Reserve (half-yearly 4 per cent)	80,000.00
Temiskaming (regular 3 per cent. quarterly)	75,000.00
Temiskaming & Hudson Bay ($6 per share on 7,700 shares)	46,200.00
Buffalo (regular 3 per cent. quarterly)	27,000.00
City of Cobalt (interim 3 per cent. and 2 per cent. bonus)	25,000.00
Grand total from July 1st to 20th	$635,546.85

STATISTICS AND RETURNS.

NOVA SCOTIA COAL MINES.

Nova Scotia Steel and Coal Company—

Shipments July, 1908	72,740
Shipments, July, 1907	82,605
Decrease July, 1908	9,865
Shipments 7 months, 1908	360,335
Shipments 7 months, 1907	323,287
Increase 7 months, 1908	37,048

Intercolonial Coal Company—

Shipments July, 1908	19,246
Shipments July, 1907	23,919
Decrease July, 1908	4,673
Shipments 7 months, 1908	153,769
Shipments 7 months, 1907	155,816
Decrease 7 months, 1908	2,047

Inverness Railway and Coal Company—

Shipments July, 1908	24,375
Shipments July, 1907	27,960
Decrease July, 1908	3,585
Shipments 7 months, 1908	152,666
Shipments 7 months, 1907	130,997
Increase 7 months, 1908	21,669

Acadia Coal Company—

Shipments July, 1908	24,907
Shipments July, 1907	30,080
Decrease July, 1908	6,046
Shipments 7 months, 1908	187,555
Shipments 7 months, 1907	172,974
Increase 7 months, 1908	14,581

Cumberland Railway and Coal Company—

Shipments July, 1908	24,590
Shipments July, 1907	37,063
Decrease July, 1908	12,473
Shipments 7 months, 1908	222,865
Shipments 7 months, 1907	213,413
Increase 7 months, 1908	9,452

DOMINION COAL COMPANY'S OUTPUT.

The July output of the Dominion Coal Company is in the vicinity of 368,000 tons. The company, for the seven months of the year, shows an output of 2,292,000 tons, or 317,000 tons ahead of a year ago. The output in detail follows:

	Tons, 1908.	Tons, 1907.
January	314,108	252,248
February	285,649	225,988
March	346,529	212,831
April	298,745	316,384
May	332,588	327,269
June	347,000	319,000
July	368,000	321,000
Total tons	2,292,619	1,974,720

CROW'S NEST PASS OUTPUT.

The output of the Crow's Nest Pass Coal Company for the week ended August 1st was 24,711 tons, a daily average of 4,118 tons. For the corresponding week of last year the output was 21,677 tons, a daily average of 3,613 tons.

Sydney, August 4.—July was another record breaker for output from the collieries of the Nova Scotia Steel and Coal Company, being over three thousand tons greater than the previous month. The figures follow:

No. 1	21,153
No. 2	3,097
No. 3	24,495
No. 3	1,337
No. 4	9,236
Total	59,318

THE DOMINION STEEL OUTPUT FOR JULY.

The furnaces were idle the first five days of July for holiday and other causes. The balance of the month produced 22,080 tons of steel, from which was rolled 16,405 tons of rails, 2,503 tons of rods, besides considerable tonnage of steel blooms and billets for the market. Shipments aggregated 23,332 tons.

Toronto.—Shipment returns from the Cobalt camp for the week ending Saturday, August 1st, were a little belated this week. They totalled 1,021,331 pounds of ore or 510 tons, considerably less than the previous week, which amounted to 743 tons and was a record. Ten mines shipped for the year to date 22,569,053 pounds, or 11,234 tons. Shipments for the week and year to date are:

	Week end Aug. 1, Pounds.	Since Jan. 1, Pounds.
Buffalo	759,950	.....
Coniagas	714,480	.....
Cobalt Lake	341,683	.....
Crown Reserve	.....	128,000
Cobalt Central	.....	247,515
City of Cobalt	42,210	781,240
Drummond	62,300	300,700
Foster	.....	238,400
Kerr Lake	.....	522,974
King Edward	.....	127,240
La Rose	285,040	3,577,442
McKinley	.....	2,019,260
Nipissing	120,600	2,285,960
Nova Scotia	311,775	.....
Little Nipissing	40,110	.....
Nancy Helen	40,000	367,110
O'Brien	63,790	3,734,437
Peterson Lake	.....	41,237
Right of Way	121,100	612,100
Provincial	.....	143,210
Silver Leaf	61,410	258,030
Silver Cliff	52,000	.....
Silver Queen	.....	879,310
Townsite	.....	130,700
Temiskaming	.....	445,000
T. & H. B.	724,000	.....
Tretheway	170,250	1,664,296
Watt	54,630	420,990

COBALT ORE STATEMENT FOR THE WEEK ENDING AUGUST 8, 1908.

O'Brien Mine—

Aug. 1	Am. Smelting & Refg. Co., Denver, Col.	64,160
Aug 4	Deloro M. & R. Co., Deloro, Ont....	64,220
Aug. 7	Am. Smltg. & Refg. Co., Denver, Col..	63,380

La Rose Mines—

Aug. 3	Am. Smltg. ¾ Refg. Co., Denver, Col..	60,000
Aug. 6	Am. Smltg. & Refg. Co., Denver, Col..	62,000
Aug. 7	Am. Smltg. & Refg. Co., Denver, Col..	62,000

Townsite—

Aug. 4	Can. Copper Co., CopperCliff, Ont....	66,800

Nipissing Mines—

Aug. 5	U. S. M. & R. Co., Chrome, N.J.....	64,540
Aug. 5	U. S. M. & R. Co., Chrome, N.J.....	61,290
Aug. 7	Can. Cop. Co., Copper Cliff, Ont.....	64,400

Temiskaming—

Aug. 4	Deloro M. & R. Co., Deloro, Ont.....	40,600
Aug. 6	Am. S. & R. Co., Denver, Col.....	60,000

Drummond—

	Can. Cop. Co., Copper Cliff, Ont.....	66,800
	Grand total.	774,390

SHIPMENTS FROM THE COBALT DISTRICT FOR THE HALF YEAR OF 1908 (TONS).

Mine.	January.	February.	March.	April.	May.	June.	Total.
Buffalo Mine.	89.83	63.20	53.35	51.94	46.22	41.57	346.11
City of Cobalt.	.....	50.00	60.97	55.26	.....	112.23	287.46
Cobalt Lake.	25.44	32.45	30.76	1.96	33.25	.....	123.86
Coniagas.	67.86	32.45	93.30	.....	62.13	62.65	318.39
Cobalt Central.	20.00	.....	24.85	28.74	23.72	26.27	123.58
Crown Reserve.	.....	6.84	.....	19.27	.....	22.56	48.67
Casey Cobalt.	.....	.....	10.00	.....	.....	.....	10.00
Cobalt Silver Queen.	125.40	.....	119.59	21.95	59.25	.....	326.19
Drummond.	.....	46.17	.....	.....	28.13	19.80	94.10
Foster.	54.30	.....	.....	.....	34.90	.....	89.20
Kerr Lake.	20.64	21.05	92.73	30.57	31.30	79.50	275.79
King Edward (Watts)	32.00	61.45	25.90	.....	65.22	30.08	214.65
La Rose.	459.97	71.06	388.37	431.90	161.90	180.94	1694.14
McKinley-Darragh.	64.70	193.52	121.33	181.66	126.24	125.05	812.50
Nipissing.	188.97	127.32	125.93	105.79	293.12	234.98	1076.11
Nova Scotia.	20.39	.....	20.00	13.80	52.47	21.50	129.16
Nancy Helen.	.....	.....	69.52	.....	.....	.....	69.52
O'Brien.	202.89	264.27	258.78	125.53	392.00	286.96	1530.43
Peterson Lake.	.....	.....	.....	.....	.....	29.05	29.05
Provincial.	.....	.....	24.60	51.24	.....	.....	75.84
Right of Way.	.....	.....	29.35	.....	90.04	60.37	179.76
Silver Bar.	.58	.....	.....	.....	.....	.....	.58
Silver Cliff.	26.80	.....	.....	.....	.....	.....	26.80
Silver Leaf.	31.00	.....	.....	35.40	32.26	.....	98.66
Temiskaming.	29.70	26.90	56.12	60.50	46.30	92.88	312.40
Temiskaming & Hudson Bay.....	.....	99.05	36.15	.....	29.76	31.85	196.81
Townsite.	20.80	.....	20.56	.....	.....	.....	41.36
Trethewey.	.....	88.80	153.11	96.49	159.14	33.85	631.39
Totals.	1481.27	1184.53	1815.27	1312.00	1768.35	1583.09	9144.51

This was shipped as follows:

Country.	January.		February.		March.		April.		May.		June.		Totals.	
	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.
Canada. .	292.40	19.74	310.32	26.20	713.56	39.31	306.27	23.34	505.81	28.60	435.76	27.53	2583.88	27.45
U. S. ...	1188.87	80.26	841.76	71.06	1029.70	56.72	975.63	74.36	1262.54	71.40	1117.48	70.58	6415.99	70.73
Gt. Britain	.....	.....	32.45	2.74	40.56	2.24	30.10	2.30	.....	.....	29.85	1.88	132.96	1.55
Germany	.....	.....	.....	.....	31.45	1.73	.....	.....	.....	.....	.....	.....	31.45	.29
Totals	1481.27	100.00	1184.53	100.00	1815.27	100.00	1312.00	100.00	1768.35	100.00	1583.09	100.00	9144.51	100.00

BRITISH COLUMBIA ORE SHIPMENTS—WEEK ENDING AUGUST, 1980.

Following are the shipments from the mines and receipts at the smelters for the past week and year to date:

Ore Shipments.

Boundary—

	Week.	Year.
Granby	20,261	624,566
Mother Lode	10,492	78,628
Oro Denoro	3,440	25,368
Rawhide	2,260	8,300
Brooklyn	2,260	5,400
Sunset	515	2,818
Mountain Rose	80	270
Athelstan	120	120
Total	39,308	746,011

Rossland—

Centre Star	3,219	97,622
Le Roi	1,406	45,000
Le Roi No. 2	344	17,350
Evening Star	36	624
Other mines	.....	63
Total	5,005	160,719

Slocan-Kootenay—

St. Eugene	584	12,303
Whitewater, milled	280	8,540
Poorman, milled	250	6,850
Queen, milled	185	5,540
North Star	45	2,139
Richmond	23	1,113
Arlington, Erie	26	903
Blue Bell	165	506
Ruth	40	478
Sunset	19	206
Reco	21	185
Keystone	8	50
Little Robert	1	1
Other mines	.....	17,990
Total	1,647	56,807

The total shipments for the past week were 45,960 tons, and for the year to date 963,537 tons.

Smelter Receipts.

Grand Forks	20,261	624,566
Greenwood	14,052	106,036
Boundary Falls	5,115	16,788
Trail	6,545	164,430
Northport (Le Roi)	1,576	48,665

The total smelter receipts for the past week were 47,549 tons, and for the year to date 966,205 tons.

Following is the report of the manager of the Le Roi mine for the month of June, as cabled to the London office of the company:

"Shipped from the mine to Northport during the past month 5,100 tons, containing 2,429 ounces gold, 2,450 ounces silver and 101,000 pounds copper. Expenditure on development work during the month, $9,000."

Following is the report of the manager of the Le Roi Two for the month of June, as cabled to the London office of the company:

"Shipped 2,390 tons. The net receipts are $48,626 (£10,026), being payment for 2,352 tons shipped, and $1,067 (£220), being payment for 76 tons concentrates shipped; in all $49,693 (£10,246)."

Following are the figures of German consumption of foreign copper for the months January-May, 1908:

	Tons.
Imports of copper	72,247
Exports of copper	3,354
Consumptio nof copper	68,893

As compared with consumption during the same period in 1907 of 47,979 tons.

Of the above quantity 67,155 tons were imported from the United States.—Figures from L. Vogelstein & Co.

The following were the figures of German consumption of foreign copper for the months January-June, 1908:

	Tons.
Imports of copper	82,968
Exports of copper	3,878
Consumption of copper	79,090

As against consumption during the same period in 1907 of 55,507 tons.

Of this quantity 75,759 tons were imported from the United States.—L. Volegstein & Co.

MARKET REPORTS.

Coke.

August 11.—Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.60.

Foundry coke, prompt, $2.00.

Other Metals.

August 11

Tin, Straits, 30.75 cents.

Copper, prime lake, 13.875 to 14 cents.

Lake, arsenical brands, 13.85 to 13.95 cents.

Electrolytic copper, 13.875 cents.

Sheet copper, 18 cents.

Copper wire, 15.25 cents.

Lead, 4.60 cents.

Spelter, 4.75 cents.

Sheet zinc, 7.50 cents.

Antimony, Cookson's, 8.25 to 8.375 cents.

Aluminium, 32 cents.

Nickel, 45 to 47 cents.

Platinum, $23.50 per ounce.

Bismuth, $1.75 per pound.

Quicksilver, $42.50 per 75-pound flask.

Silver Prices.

	New York, cents.	London, pence.
July 8	53¼	24 9-16
July 9	53½	24 11-16
July 10	53¼	24 9-16
July 11	53¼	24 9-16
July 13	53⅝	24¾
July 14	53⅜	24⅝
July 15	53⅜	24⅝
July 16	53¼	24 9-16
July 17	53	24 7-16
July 18	53¼	24 9-16
July 20	53⅛	24½
July 21	52¾	24 5-16
July 22	52⅞	24⅜
July 23	52½	24 3-16
July 24	52⅜	24 3-16
July 25	52½	24¼
July 27	52⅜	24 3-16
July 28	52½	24¼
July 29	52⅞	24⅜
July 30	52¾	24 5-16
July 31	52½	24 3-16
Aug. 1	52½	24 3-16
Aug. 3	52½	..
Aug. 4	52⅞	24⅜
Aug. 5	52½	24¼
Aug. 6	52⅜	24 3-16
Aug. 7	52⅛	24 1-16
Aug. 8	52⅛	24 1-16
Aug. 10	52	24
Aug. 11	51⅝	23 13-16

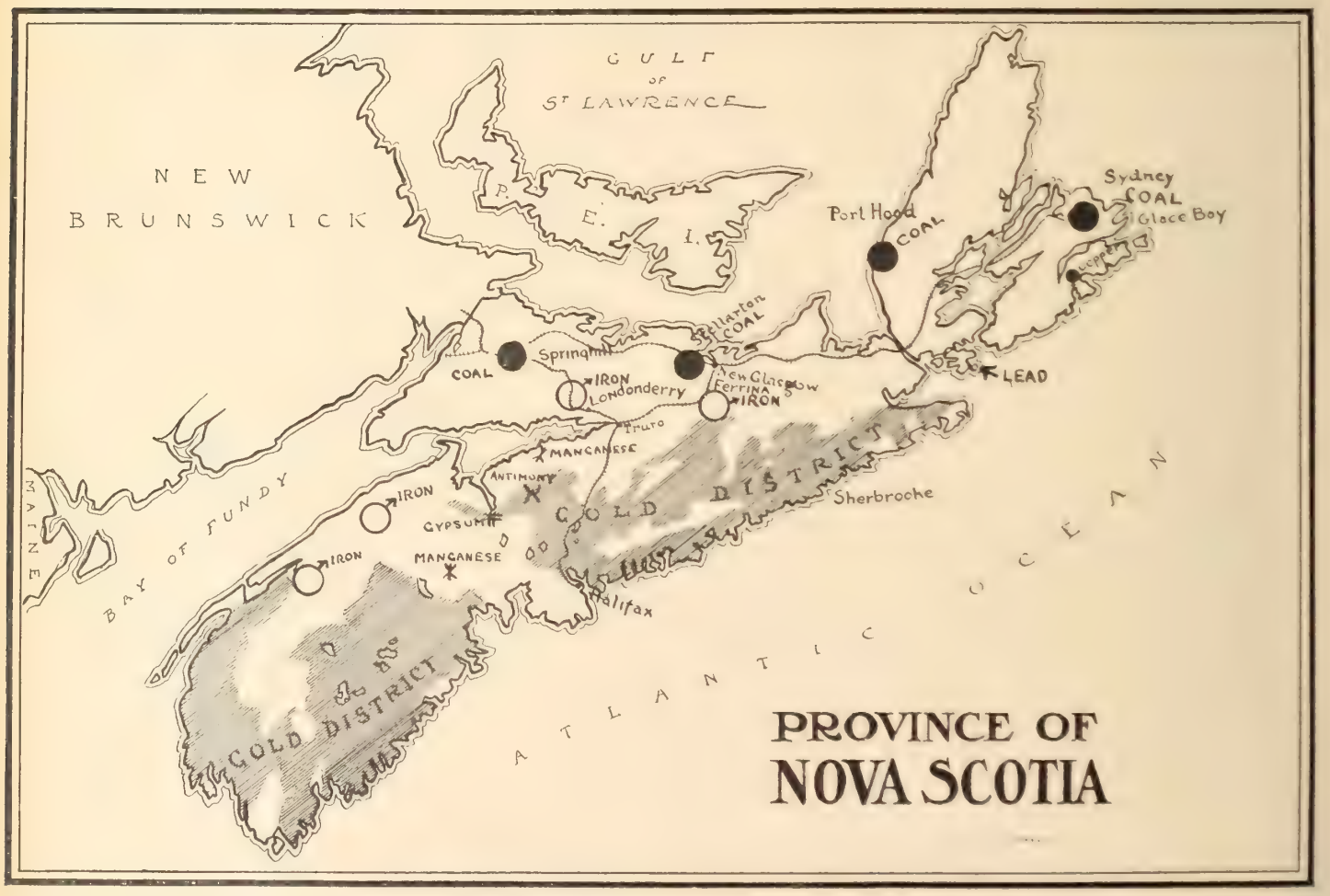
MARKET NOTES.

Immediate advances in the price of tin and slow gains in copper prices are predicted by market authorities. The general improvement in the metals market is likely to continue.

Antimony firm and shows signs of strengthening.

Pig iron is low but firm.

Coke production is increasing rapidly.



MAP OF NOVA SCOTIA.

The Boston-Richardson Mine, temporarily closed owing to financial difficulties, is situated on the Atlantic Coast of Nova Scotia. (See General Mining News.)

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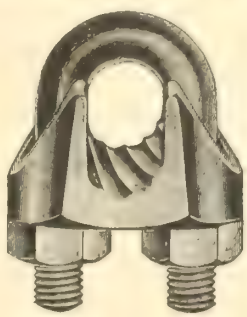
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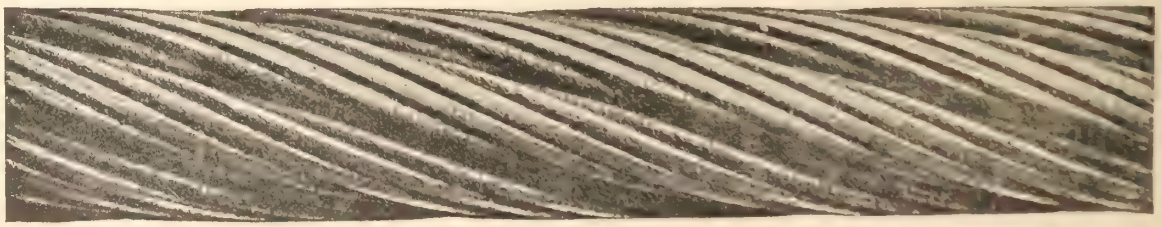


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In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre:

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St. Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

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JUDICIAL SALE

of all Assets of the Copper Mining and Smelting Company of Ontario, Limited in Liquidation.

Sealed tenders will be received, addressed to His Honor F. W. Johnson, Local Master, Sault Ste. Marie, Ontario, and marked "Tenders in THE COPPER MINING AND SMELTING COMPANY of Ontario, Limited, Liquidation," up to twelve o'clock noon on the Fifteenth day of September, 1908, for the purchase of all the assets of the said Company now in the possession and control of the Liquidators, which assets consist of the valuable Mine and Mining Property situated in the Town of Bruce Mines in the District of Algoma and Province of Ontario, on the North shore of Lake Huron (where there is a good harbour and shipping facilities) with machinery, buildings, plant and full equipment situated on the premises, and wharfage, railway tracks and sidings.

Tenders will be received for the entire property or for any of the following parcels:

PARCEL 1

Mine, Mining Rights, Buildings, Machinery, Plant, Concentrating Mill, Railway Track and Sidings, Coal Dock, Skimpings, Slimes and Ore already won. There are two principal working shafts some 500 feet in depth, which have been in full operation until recently. The property consists of all the mineral rights in two grants or locations, embracing an area of some 20 square miles (with the exception of 116 acres already disposed of), also the surface rights of about 665 acres of said lands (of which 300 acres are within the limits of the Town of Bruce Mines).

Bruce Mines Station of the Canadian Pacific Railway, situated on the property, is 135 miles from Sudbury and 37 miles from Sault Ste. Marie. The Bruce Mines and Algoma Railway here crosses and runs down to the Lake, having a station and sidings convenient to the mines.

THE BUILDINGS, adapted to large operations, are in good condition, and consist of machine shop, fully equipped, blacksmith's shop, store houses, oil house and boiler houses, two power houses, mill offices, Manager's and Mill Superintendent's houses, boarding house, ice house, stable and dynamite magazine.

THE MACHINERY AND PLANT, which are in good running order, have an inventory valuation of $96,500.00. The concentrating mill, situated on the Lake front, has a capacity of 250 tons per day and pumping plant of 60,000 gallons per hour. Its construction and equipment cost $130,000.00. The Electric Light plant has a capacity of 500 lights. One and one half miles of Railway Track (with sidings) connect the mine proper with the Concentrating Mill and Coal Dock, where vessels drawing 16 feet can load and unload.

THE SKIMPINGS, estimated at 120,000 tons, are useful for fluxing purposes in nickel smelters, and for the manufacture of artificial stone. A separate tender for these skimpings will be considered. The ore already won and in the stopes is estimated at 9,000 tons. Considerable development work has also been done on the property exposing a large body of ore.

PARCEL 2

TOWN AND PARK LOTS, containing about 300 acres within the town limits, sub-divided into over 100 convenient building lots.

WATER LOTS, situated in front of the Concentrating Mill and adjoining the coal dock.

ISLANDS: "French," "McCoys," "Bruce," "Rat," "Mouse," having in all an estimated area of 75 acres, with some suitable lumber-mill sites.

PARCEL 3

RANGE LOTS, consisting of about 365 acres in the Township of Plummer Additional.

PARCEL 4

WHARF AND WAREHOUSES, conveniently situated, adjoining the Government Dock, with 16 feet depth of water.

Tenders for separate lots and islands mentioned in parcels 2 and 3 will be considered.

The principal workings are being kept free of water and will be open for examination by intending purchasers. Full descriptions and particulars of the real estate and full details, inventories, etc., of the plant, machinery and other assets of the Company can be obtained upon application to the Liquidators - T. Hayes Sheen, Jnr., at Bruce Mines, Ont., or R. C. Jennings, 18 Toronto Street, Toronto. A full inspection of all the property may be had at any time.

As to the real estate, it is understood that the foregoing description is only a general description and the areas given are only approximate and the purchaser is to satisfy himself as to the quantity of land and the title of the Company thereto and shall search the title at his own expense and the liquidators will not be required to furnish any abstract of title or to produce any title deeds other than those in their possession.

TERMS OF SALE: 10 per cent. cash; 40 per cent. within 30 days, and balance within 60 days, with interest at 7 per cent, secured to the satisfaction of the Liquidators. **The tenders must be accompanied by a marked cheque, payable to the Liquidators for 10 per cent of the amount of tender, which will be returned if tender is not accepted.**

The highest or any tender not necessarily accepted.

The other conditions of sale are the standing conditions of sale of the Court as far as applicable.

For further particulars and conditions of sale, application may be made to either of the above-named Liquidators or their Solicitors.

DATED at Sault Ste. Marie this Third day of July, A.D., 1908.

F. W. JOHNSON, Local Master.

HEARST, McKAY & DARLING, Sault Ste. Marie, Ont.
Solicitors for Liquidators.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

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Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

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Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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The Canadian Miner's Buying Directory.

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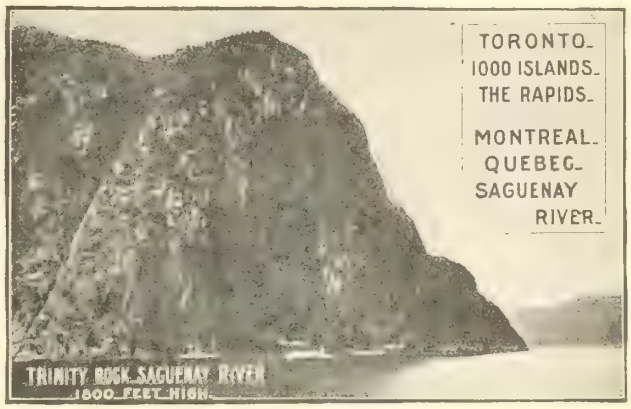
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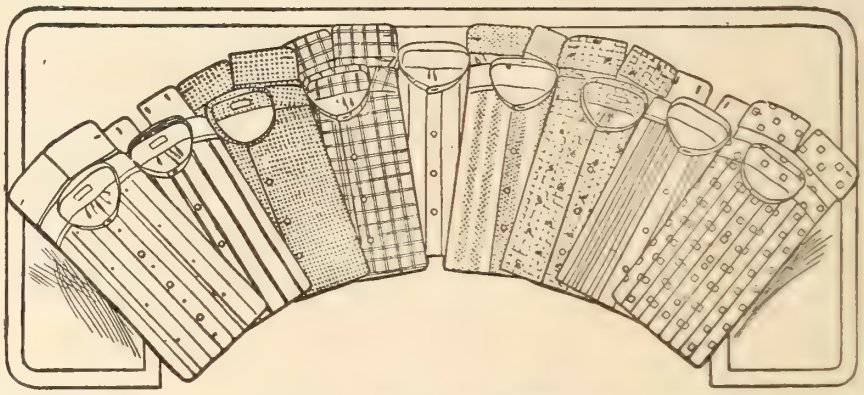
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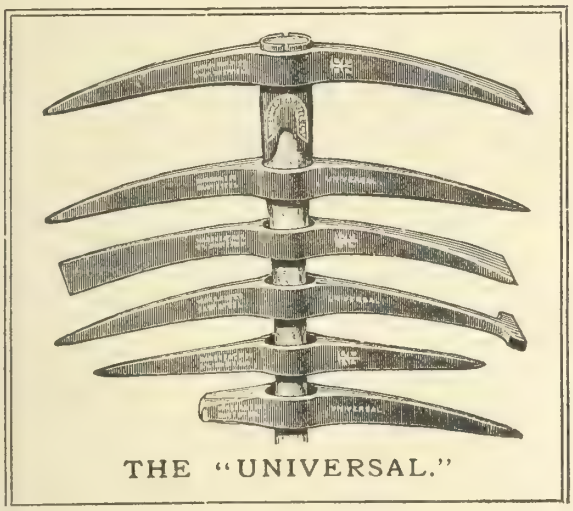
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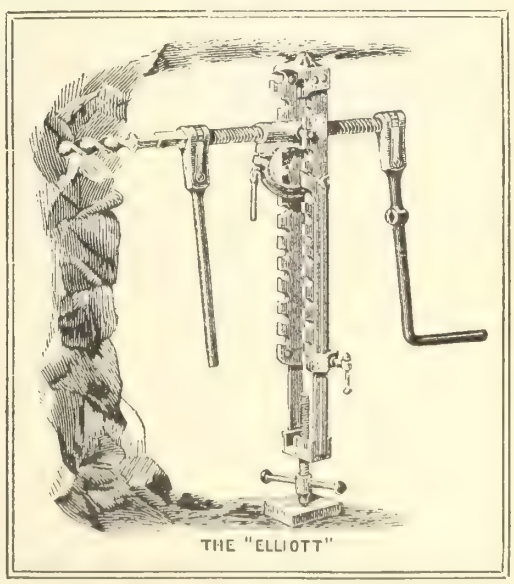
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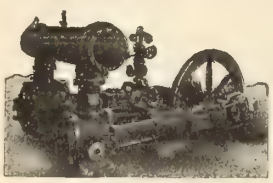
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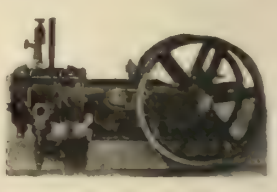
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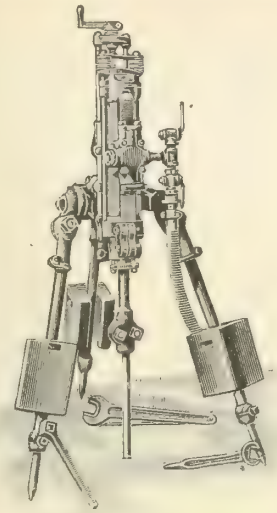
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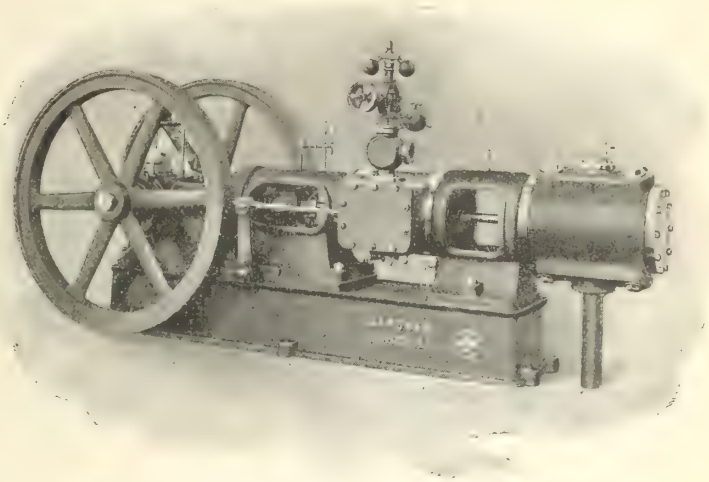
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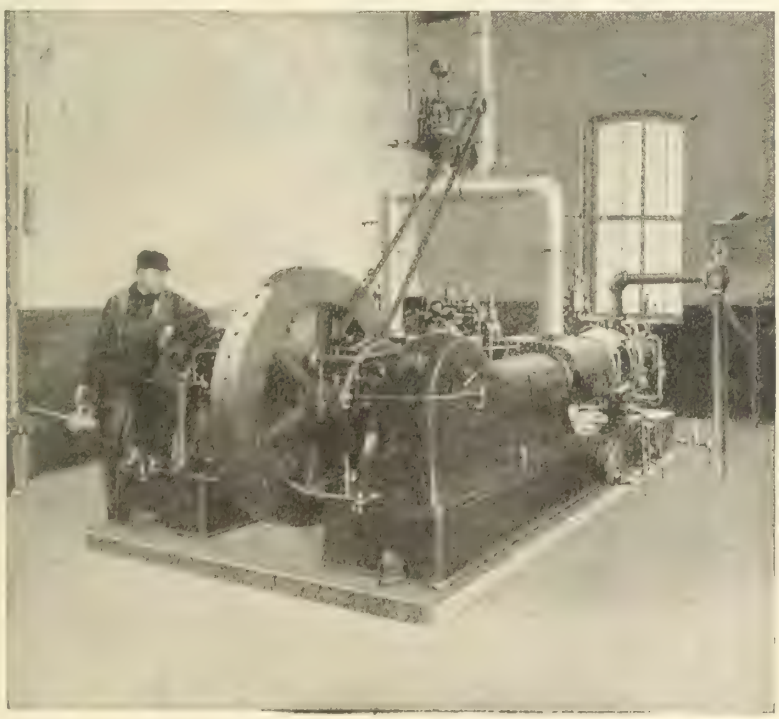
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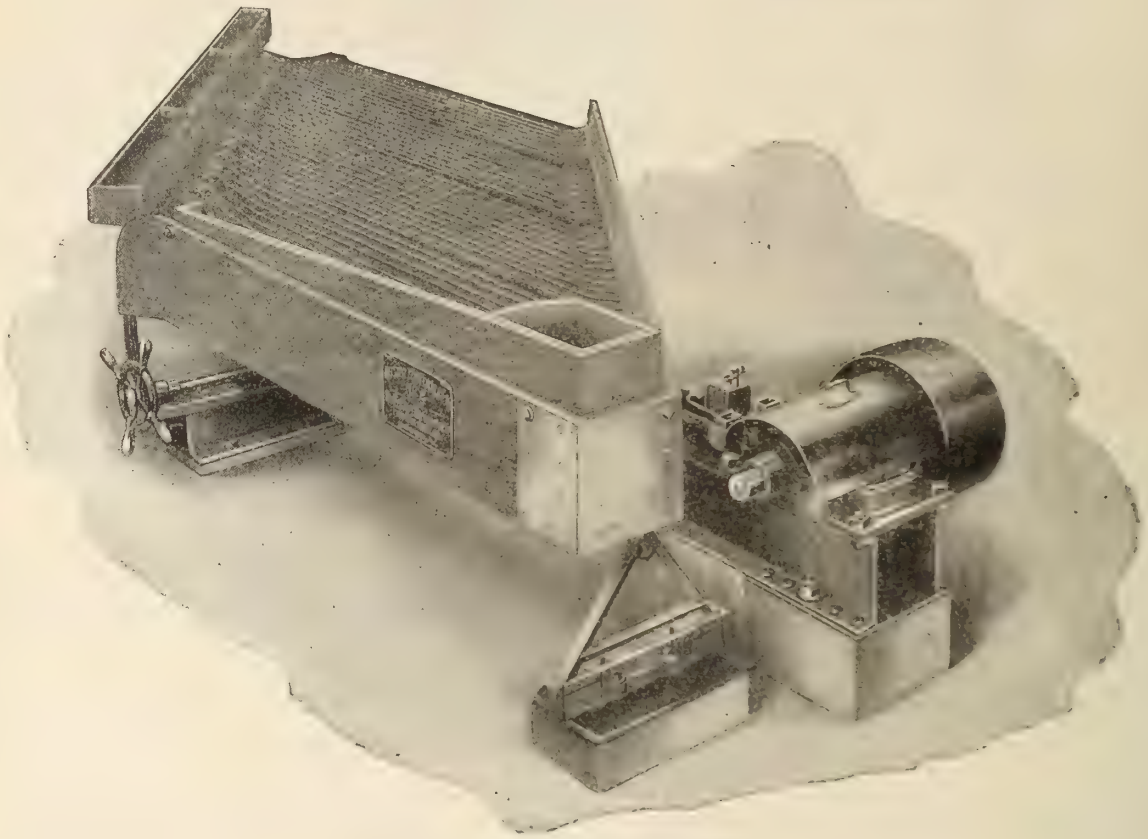
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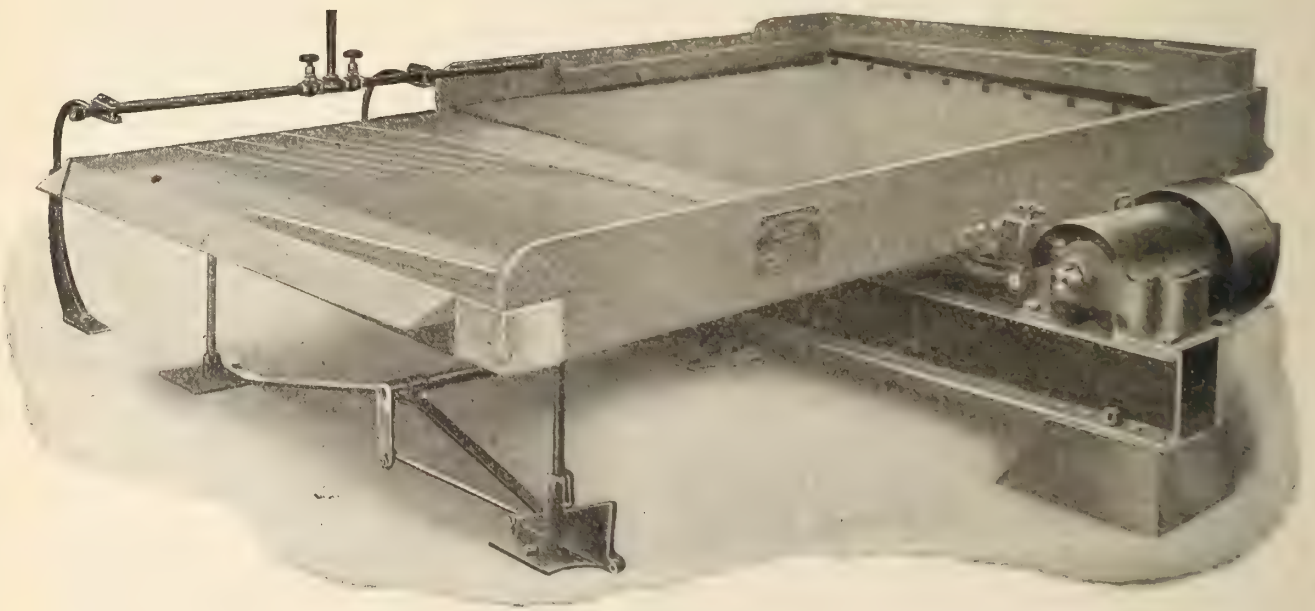
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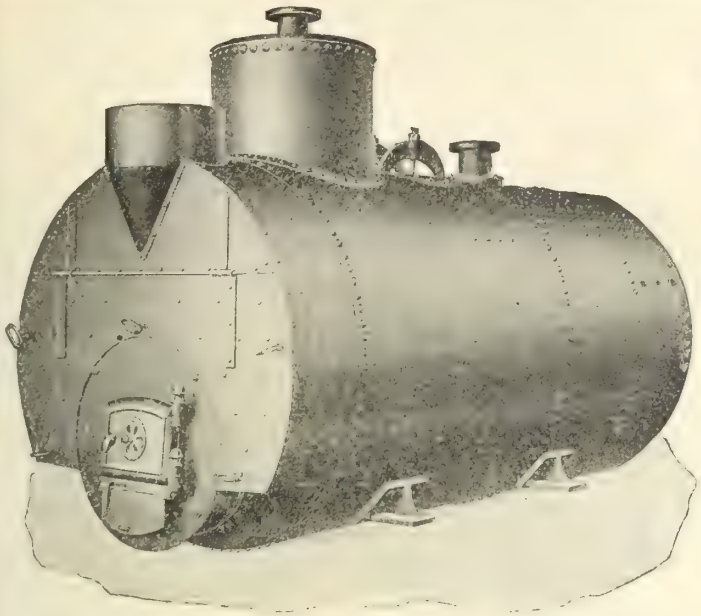


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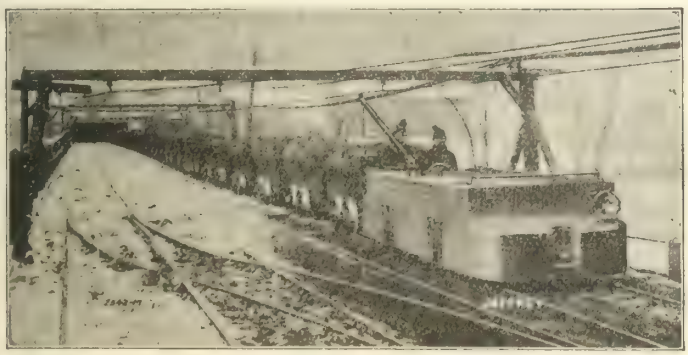
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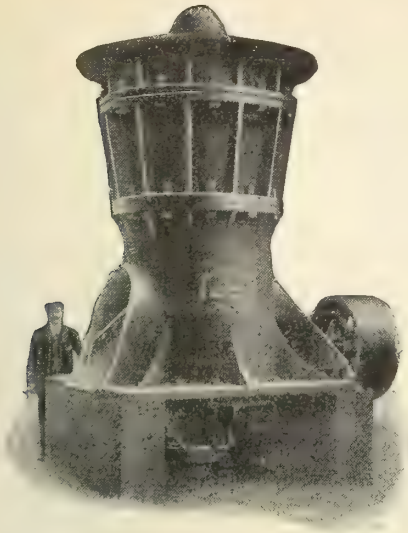
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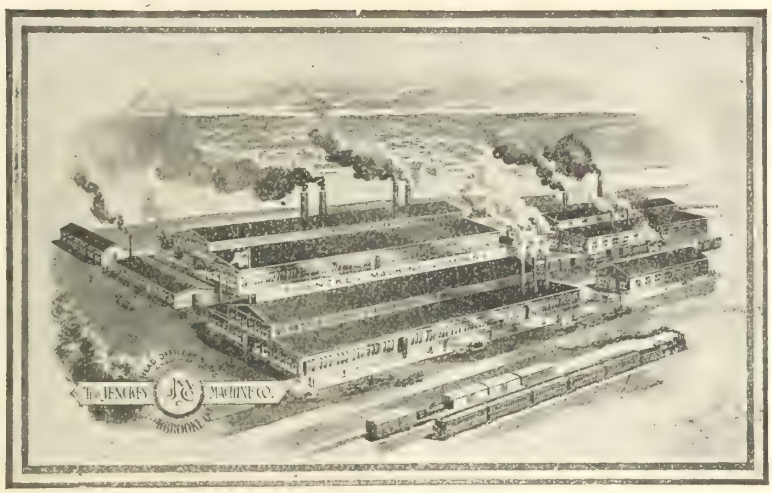
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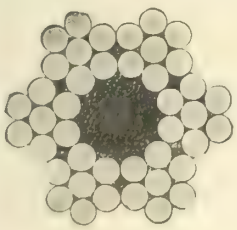
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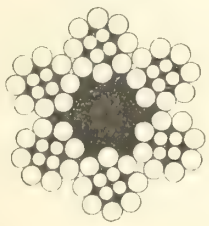
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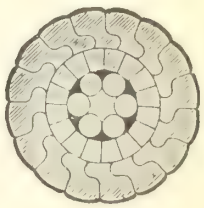
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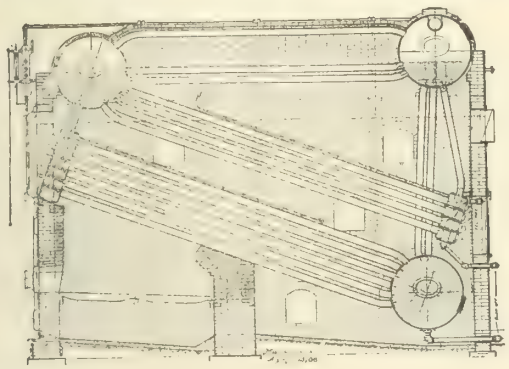
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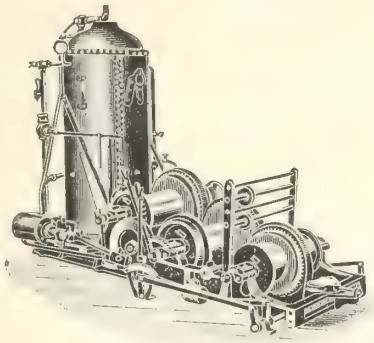
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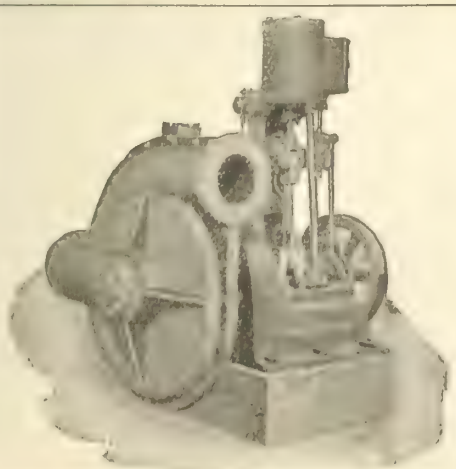
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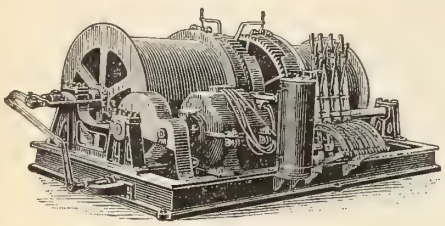
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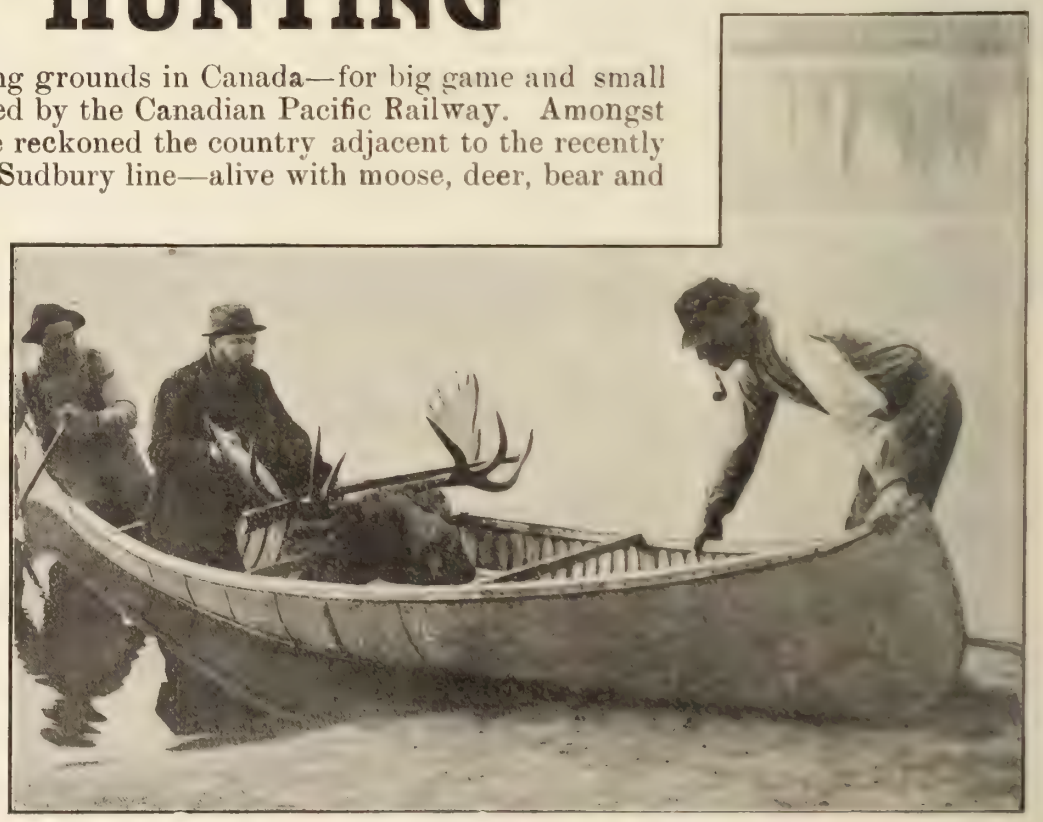
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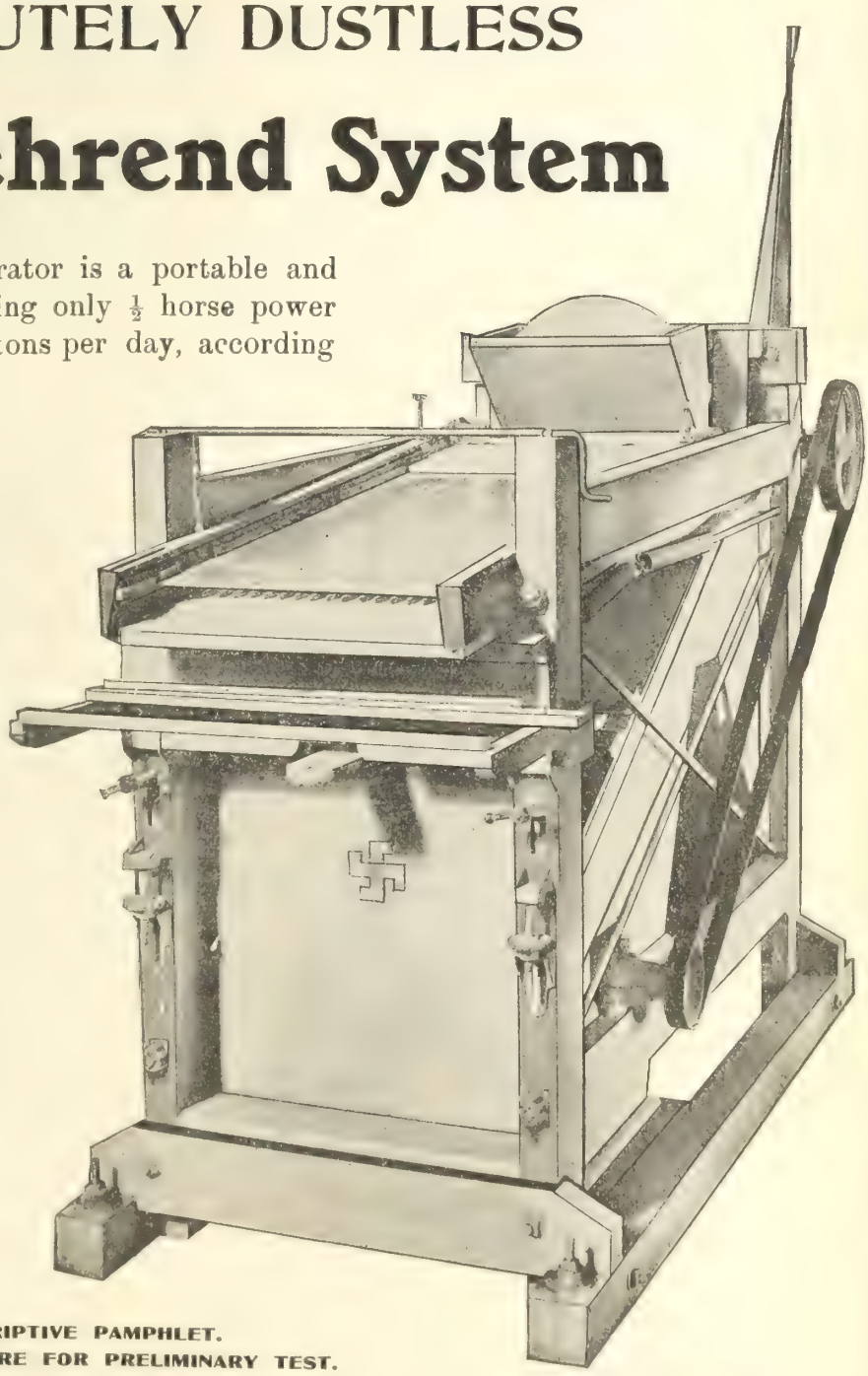
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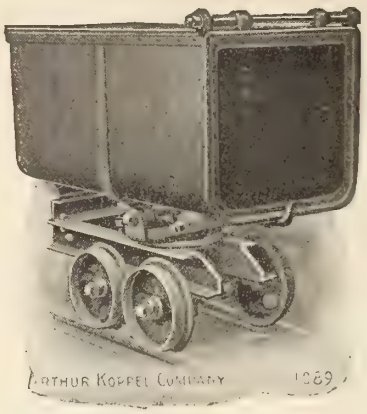
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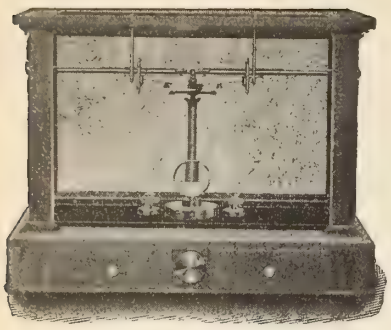
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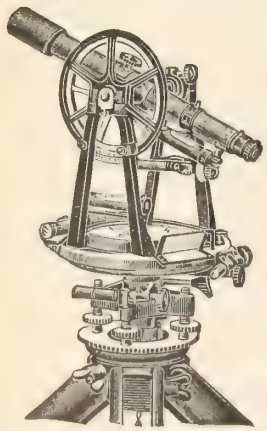
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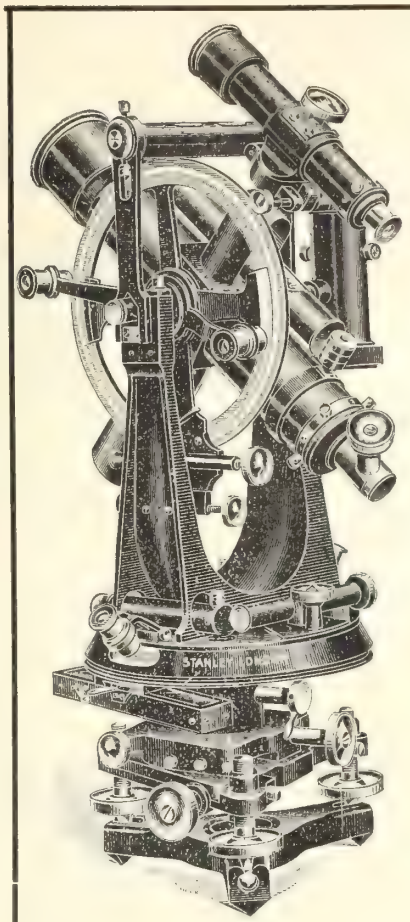
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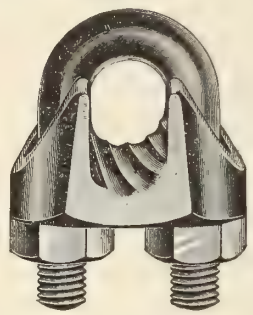
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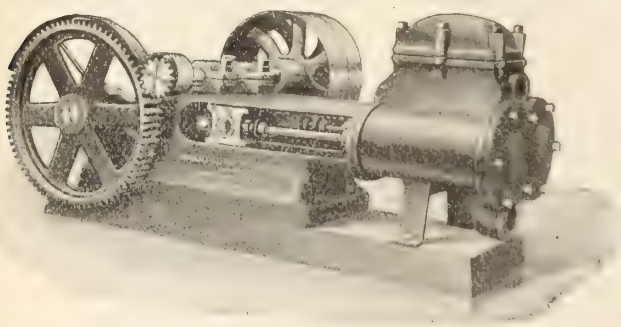
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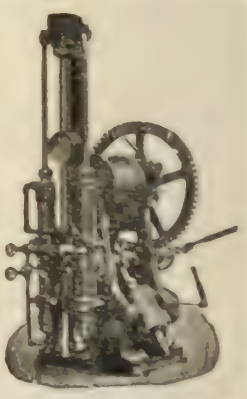
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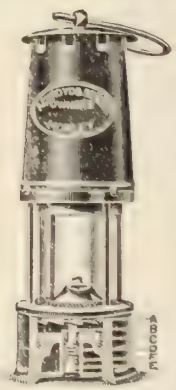
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO and MONTREAL, September 1, 1908 No. 17

The Canadian Mining Journal

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CIRCULATION.

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THE CANADIAN ANNUAL REVIEW OF PUBLIC AFFAIRS, 1907.

Mr. Hopkins' labors are of immediate use and of future value. The Annual Review gives a comprehensive account of the political, financial and industrial progress of Canada during the past year.

Part of Section IV. is devoted to mining. The operations of boomsters at Larder Lake and the aid vouchsafed these malign operators by the Toronto newspapers, are the text of a considerable part of the chapter.

Mr. Hopkins states, in referring to the case of Law & Co., that proceedings were initiated by the Provincial Secretary's Department. This is an error. The Canadian Mining Journal succeeded, after weeks of futile effort, during which several Toronto newspapers refused to take up the question in any manner, in instituting proceedings against Law for breach of the Ontario Companies Act. The whole work of investigation fell upon the Journal. Later, when at the instance of the Journal more serious charges were laid, the Department acted promptly.

Any opinion, separated from its context, may take on a meaning that it was not intended to have. The Annual Review quotes us as declaring that Larder Lake would never be anything but a low-grade camp at best. This opinion was accompanied by a statement that so little was known of the district that no final opinion could be formed. While we have but slight reason to modify this dictum, the known occurrence of bonanza ore on one or two claims lends a more cheerful aspect to the yet undeveloped region.

We note with pleasure the amount of space devoted by the editor of the Annual Review to the industry whose welfare is our especial object. Incidental errors are bound to occur; but in the main Mr. Hopkins summary is broad and accurate.

Mr. Hopkins has some words of praise for our banking system. As the mining industry is, to a marked extent, dependent upon the attitude and policy of the banks, it is not amiss to notice a few facts not mentioned in the Annual Review. The public generally has little conception of the true conditions that underlie "tight money." It is a condition that could not prevail were our banks true to the interests of the country. Moreover, the enormous current of money that finds its way out of Canada and into New York in the shape of call loans is a constant handicap to the progress of our industries.

A startling feature of our banking system, one that makes absurd all loud boastings as to inherent stability and soundness, is the little known fact that our paper currency has no gold reserve behind it. It is true that the Government paper notes of low denomi-

nation are supported by a reserve of gold and Imperial bonds. But our bank notes are absolutely devoid of gold backing.

Thus, while Mr. Hopkins is perhaps just in his praise of the prevision of certain bankers who warned the public early in 1907 to restrict their operations, he could truthfully add that this warning would not have been needed did we not possess one of the most lamentably weak, illogical and flimsy systems of banking that the world has ever seen.

The public usually believes what it is told to believe, especially if its information comes from dignified sources. How it has been led into accepting the totally inaccurate impressions that are current regarding Canadian banking methods is hard to imagine. If our insurance companies needed investigation, and even Mr. Hopkins does not affirm to the contrary, then the banking corporations also needed probing. Not until the evils that are sapping the foundations of our national health have been rectified will our industries progress as they should. With a sound banking system, a currency that is not merely paper, and legislative restraint on the exportation of our earnings, panics and depressions would not occur with such mathematical regularity.

It is apparently impossible to induce our newspapers to take up questions of this sort. The overwhelming influence of corporations converts most of our writers and publicists into phonographs and lickspittles. The man who dares to speak his mind is systematically blackened in reputation and can get no hearing. Therefore our principal need, as a nation, is a plentiful supply of fearless and informed writers who will neither sell their souls for that which is not, nor bow the knee to Baal.

All of which has little to do with Mr. Hopkins' excellent, painstaking and inoffensive volume. Mr. Hopkins may be neither a prophet nor the son of a prophet. It is wildly improbable that upon so industrious and appreciative a person as he, will fall the disagreeable burden of writing of things as they are—not as we are told they are. Rather is Mr. Hopkins an ardent believer in constituted authority, in the divine right of banks and the eternal usefulness of buncombe.

THE BOSTON-RICHARDSON.

Readers of the Canadian Mining Journal are familiar with the operations of the Boston-Richardson gold mine.

For some years this mine has been a steady producer. The ore worked is low grade, the gold content averaging not more than $3.00 per ton. The equipment consists principally of a sixty-stamp mill (we are informed that forty additional stamps are being installed), six Wilfley tables and a bromo-cyanide plant.

During the year ended September 30, 1907, 43,456 tons of ore were crushed, yielding 6,504 ounces of gold, an average of about $2.85 per ton. The total cost of operation, per ton of ore milled, amounted to about $1.90. Thus a net profit of $41,283 should be expected. However, during the past year large sums have been expended in enlargement of plant. Moreover, during July of this summer, the ore suddenly dropped in value. The drop was not sufficiently pronounced to have affected operations vitally at a time when the company was not embarrassed. For instance, if the mine had been working normally with its enlarged plant in full operation for a period of twelve months, working profits could have been counted upon to straighten matters out. For, although the margin of profit is small, it has heretofore been constant, and the company was acting in accordance with sound business principles in adding to their plant.

But a combination of misfortunes, including tight money, has crippled the operators of the Boston-Richardson and, unless immediate steps are taken, gold mining in Nova Scotia will have received a fatal blow.

The avowed policy of the Government of Nova Scotia has been to encourage gold mining by all legitimate means. On certain deep mining operations actual financial aid has been offered. But very few operators, if any, have availed themselves intelligently of the Government's offer.

In the case of the Boston-Richardson, we have an example that is worth dwelling upon. The operators have put up an arduous and plucky fight. The sturdy faith of the management in themselves and in the mine has been justified by several years of successful operation. They have met difficulties and discouragements with fortitude and equanimity. Their mine has been a bright spot in the recent history of Nova Scotia gold mining. If that bright spot be now eclipsed the consequences will be disastrous in the extreme.

In view of all this we venture to submit that this is an opportune moment for the Government of Nova Scotia to step in and proffer its assistance. Such a course is fully warranted by precedent. The action of the Ontario Government in helping the Sault Ste. Marie industries is a case in point; and there are many other analogous incidents.

Just what form such assistance should take we can not presume to say. There are several possible channels. A temporary loan might meet the requirements; Australian governments have sanctioned this expedient. Or, as an alternative, the Government might become a permanent partner in the enterprise. If justification is required for this course, the attitude of the Ontario Government may be cited.

But whatever may be decided upon, it is absolutely certain that allowing the Boston-Richardson to be set down as a failure will prove the most costly and unprofitable step of all.

We have no doubt that the enlightened and progressive Government of Nova Scotia will investigate the situation thoroughly.

GAS PRODUCERS—THEIR PRESENT LIMITATIONS.

For at least thirty years gas engines have been in use. Only within the last decade, however, have large engines been put into service. The general adoption of the gas engine depended upon the production of cheap gas and the modern gas producer has provided the key to this problem.

The first producers were of the suction type, in which the suction stroke of the engine develops its charge of gas in the producer. No tarry or bituminous fuels could be used in these. Hence the only fuels available were anthracite coal, coke and charcoal. Although these limitations are being overcome, they have been and are characteristic of suction gas producers.

The pressure gas producers, in which the gas is generated under pressure and stored in a holder before being used, thus affording an opportunity for removing the impurities, is capable of utilizing bituminous coal and lignite. Peat also can be safely used, although it has not until recently proved a commercially successful fuel.

The invention of the pressure gas producer was followed by the appearance of a third type—the down-draft producer. The latter consumes completely the hydrocarbons resulting from the destructive distillation of coal.

Although in all three types of producers anthracite coal has been most commonly used, yet the tendency of late has been towards the use of bituminous coals, lignite, and peats. Suction plants are confined to small units. The larger gas producers are of either the pressure or down-draft type.

Comparing results obtained at highly efficient plants, when 10.3 per cent. of the energy stored in coal is utilized at a steam plant, the results are considered highly satisfactory. Good gas producer practice calls for the utilization of 24 per cent.

Under equal conditions, tests to determine the relative efficiency of steam plants and gas-producer plants have resulted uniformly in favor of the latter. In addition to this it has been found that low-grade coals of little or no value under the boiler, will give good results in the gas producer. This is an important point perhaps the weightiest argument that can be adduced when many of the coals of the Dominion are to be dealt with.

Despite the various advantages of the gas producer all is not plain sailing. Several considerations militate against its more general adoption; and it may be worth while recounting a few of these.

There is no doubt that the best makes of gas producers are reliable and highly efficient. Unfortunately there are many poor and untrustworthy makes being sold and installed. The failure of these machines has created much prejudice. Moreover, equally bad results have been noted when inexperienced men have been placed in charge of thoroughly good installations. These are probably the chief causes of public prejudice against or indifference to the claims of the gas producer. But the limited range of fuels that can be used in certain types of producers, the high initial cost as compared with steam-power plants, the inability of most types of producer to use bituminous coals, and the imperfect or unsuitable design of many gas engines —all these factors contribute to delay a wider demand.

It may be safely concluded that both manufacturers and purchasers need more light. Manufacturers are far too prone to drop all responsibility after a plant has been sold. On the other hand, purchasers do not take the trouble to investigate for themselves.

FERNIE.

The first appeal of the sufferers in the Fernie fire has met with a hearty response. Money and supplies have been forthcoming from all parts of Canada. The catastrophe was unique. It was spectacular. It caught and held public attention for a longer time than is usually the case.

Generously as help has been given, the situation at Fernie is by no means relieved. Winter is approaching and unless much larger donations are received by the Relief Committee there will be lamentable suffering with the advent of cold weather.

There is no need of urging the neighboring towns of Southern British Columbia to do more. They have already given unsparingly and are continuing to give.

But upon the cities and towns of Eastern Canada there will rest a stigma if they do not voluntarily come to the assistance of the stricken townspeople of Fernie. Especially is it the duty of mining centres, such as Cobalt, Sudbury, Glace Bay and Thetford to contribute according to their means. In Glace Bay there is already a movement on foot to raise money for the Relief Fund. Let other mining towns follow her good example.

Quite apart from all considerations of sentiment, it is the duty of every citizen of Canada to see that Fernie gets a fair start in her brave attempt to rehabilitate herself.

THE SUMMER EXCURSION.

A few days after this number of the Canadian Mining Journal has been distributed the Canadian Mining Institute excursionists will reach Toronto. Before arriving here the members and their guests will have visited the Dominion coal collieries at Glace Bay, the Dominion Steel Company's large works at Sydney, the Nova Scotia Steel and Coal Company's plant, the Pictou coal fields, and the iron ore deposits and workings of the Drummond interests at Torbrook, Nova Scotia. On their way through Quebec they will have surveyed the famous asbestos districts of that province. Therefore, the foreign delegates will have received a fair, though quite incomplete, impression of the directions in which our eastern mining industries are to expand.

After being entertained at Niagara and Toronto for two days the excursionists will proceed to Cobalt, Sudbury, Moose Mountain, in Western Ontario, through Alberta and, finally, through Southern British Columbia.

Extensive as is this itinerary, and numerous as are the mining districts to be visited, there are as many, or more, equally interesting and not less important, that the excursion cannot touch. Among the list of unvisited sections are the gold, antimony, manganese and gypsum districts of Nova Scotia; the manganese, iron, and gypsum bearing areas of New Brunswick; the vast hinterland of Northern Quebec, whose mineral possibilities we yet can only guess at; the varied deposits of Frontenac, Hasintgs and Renfrew counties in Eastern Ontario; the oil and gas fields to our south, and the gold, mica, antimony, coal and copper of Northern British Columbia; not to mention the reviving gold industry of the Yukon.

Therefore, it will be well for our visitors to bear in mind the fact that they are touching but the fringe of Canada's mineral belts, and that her mineral wealth is most inadequately known even by Canadians themselves.

SAFETY LAMPS AND COAL DUST.

Mr. James Ashworth, in his evidence before the British Royal Commission on Safety in Mines, developed the view that each floating particle of coal dust is sustained by a quantity of occluded hydrocarbon gases, and is capable of passing completely through both sides of the gauze of ordinary safety lamps. This is taken to be the cause of many hitherto unexplained explosions in coal mines.

The Colliery Guardian, for August 1, publishes as a supplement a digest of the Reports of H. M. Inspectors of Coal Mines. This is the second annual supplement of the sort. A few notes abstracted from the digest appear on another page of the Canadian Mining Journal.

The July Bulletin of the Canadian Mining Institute reflects credit upon the secretary, Mr. H. Mortimer Lamb. That he has been energetic and importunate in pressing his requests for technical articles is evident from the number of papers included. The Bulletin is an improvement upon its predecessors in the matter of editing. This is the more creditable when we remember that arrangements for the present summer excursion must have taken up much of the secretary's time.

THE GREAT WAIHI MINE.

Written for The Canadian Mining Journal by J. M. Bell, Director of the Geological Survey of New Zealand, and Colin Fraser, Mining Geologist.

(*Continued from last issue.*)

Origin of the Veins.

The formation of the Waihi veins, which was contemporaneous with the propylisation of the dacites enclosing them, was evidently the result of hydrothermal activity. Since the rhyolites super-imposed on the dacites contain in this locality no quartz veins, it is presumed that the formation of the veins and the propylitisation of the dacites preceded the outpouring of the rhyolites. It is interesting in connection with the hydrothermal origin of the veins to note that notwithstanding the general percolation of cold water from the surface and good ventilation, the temperature of the mine waters is considerably above the mean average temperature at the surface. The latter is about 54° Fahrenheit, while temperatures of the mine waters as high as 85° Fahrenheit have been recorded.

Vein formation as the result of the circulation of heated mineralized waters appears to have been due to:

(1) The complete or partial metasomatic replacement of the country rock by the materials brought in solution in the ascending waters.

(2) The deposition in open spaces of vein material brought in solution by the ascending waters.

These two phases of vein formation appear to have taken place along a rather complicated system of zones of multiple fracture or faulting. Metasomatic replacement of the country rock may be considered to have proceeded gradually from the more or less parallel fissure of each individual zone. The metasomatic replacement, rather than the filling of pre-existing open spaces, seems to have been the more important.

As mentioned before, the banded sulphide ores which were deposited in small, irregular fissures, carry high values in gold and silver—higher values than the replacement sulphide ores. Since these rich veins are in the main later than the replacement ore, it is possible that the richness of their values may be the result of a concentration of the values formerly in the replacement ore, by later ascending solutions. On this point, however, the writers of the present paper do not feel prepared to commit themselves until more detailed macroscopic and microscopic work than that already done has been completed. Apparently the propylitized dacite which forms the wall rocks in all the veins has not exercised any particular influence on the actual position in the veins of the pay ore deposited, since the values, though occurring more frequently on the foot-walls in the higher levels, are found elsewhere on both hanging and foot walls and throughout the veins.

It is significant that the deposit of richest ore in the Waihi Mine occurs in the Edward, near its junction with the Empire and the Welcome, and not far from the horizon where the latter and its two branches, the Regina and the Magazine, join the Martha. This bonanza may indicate an enrichment by mingling of ascending solutions.

The somewhat distinct separation of the non-payable vein material from the sulphide ore would seem to indicate that the deposition of the two was not contemporaneous. However, there is no very direct evidence on this point.

The presence of silicious sinters at the surface of the Martha lode, the absence of a gossanous outcrop, and the fact that many of the veins of the Martha system do not reach the surface, all show how limited has been the removal of auriferous material by erosion.

Mining and Treatment of the Ore.

Method of Mining.—The topographical features of the area enclosing the great gold-silver veins of the Waihi Mine admitted of only a limited amount of the ore being mined from open cuts or adits, and the supply from these workings is now almost exhausted. Principal access to the extensive underground workings is afforded by five vertical shafts, located as shown on the plan. Sinking is still proceeding in certain of these shafts, the deepest (No. 5) now extending to 1,020 feet below the surface. Drainage is effected from the most centrally situated shaft (No. 5) by means of two powerful pumps of the Cornish type. The volume of water raised has heretofore shown a gradual increase with depth, and at the lowest (850 ft.) level, which intersected all the veins, amounted to 900 gallons per minute. The conditions, however, at the 1,000 ft. level now in course of excavation are suggestive of less water existing in the deeper ground.

The principal working levels, of which there are nine below the adit, are spaced at vertical intervals ranging from 60 ft. to 150 ft. apart. Both the cross-cuts and the drifts along the lodes in these levels are provided with single or double tramways.

Timbering in the mine is reduced to a minimum owing to the good standing qualities of the ground. Only along the drifts on the veins stoped, or to be stoped, are the sets of heavy squared timber (kauri or rimu—New Zealand conifers) in evidence.

The ore was in the past mined by the usual system of rising and overhand stoping, followed by the filling in of the stoped ground with soft weathered rock excavated in open cuts and sent down through special passes. Now, however, the "shrinkage" method of stoping, a modification of the Alaska Treadwell caving system, is employed wherever the vein walls are good and the ores require no sorting. The passes from the stopes to the levels below in this case are never more than 10 ft. apart, and are placed in zig zag arrangement along the floors of the stopes. When stoping is completed in a block the ore is drawn off as required, starting from the "end of ground," and filling material is run in to replace it. Any ore left as small cone-shaped heaps between the closely-spaced passes is finally drawn off by temporarily cutting away a slab or two in the roof of the level under these particular points.

The propylitized, much silicified, dacite of the Waihi Mine, is fairly hard, breaking frequently with an almost splintery fracture, and is characterized by singular uniformity throughout the mine. The country rock in the cross-cuts and along the vein, and the vein material itself, usually stands remarkably well. The good standing qualities of the vein material is well exemplified in the stope on the Edward lode, just above the 850 ft. level. Here a width of 75 ft. of ore is exposed overhead for a considerable distance on the course of the vein without support of any kind from below.

Air-driven rock drills, mostly of the Ingersoll type, are employed both in the cross-cuts and drifts and in the stopes.

The transit of the ore from the passes in the levels to the winding shafts is effected in large trucks. Until quite recently all these trucks of ore were raised in cages to the surface, and the ore was there dumped into large hoppers. The substitution of self-dumping three-ton skips for cages at No. 6 shaft has effected a marked advance in the lifting of the ore to the surface. On the 12th May, 1908, the record amount of 1,559 tons of ore was lifted from the mine, and 750 tons of filling-in material sent down.



MARTHA HILL AND RIDGE LOOKING WESTWARD.

Key—A—Waihi Grand Junction Co.'s No. 1 Shaft; B—Waihi Co.'s No. 2 Shaft; C—Waihi Co.'s No. 1 Shaft: D—Open Cut on Martha Hill E—Waihi Co.'s No. 6 Shaft.

Railway lines equipped with light locomotives and side-dumping steel cars connect the surface ore bins at the various winding shifts with the metallurgical plants to be later described.

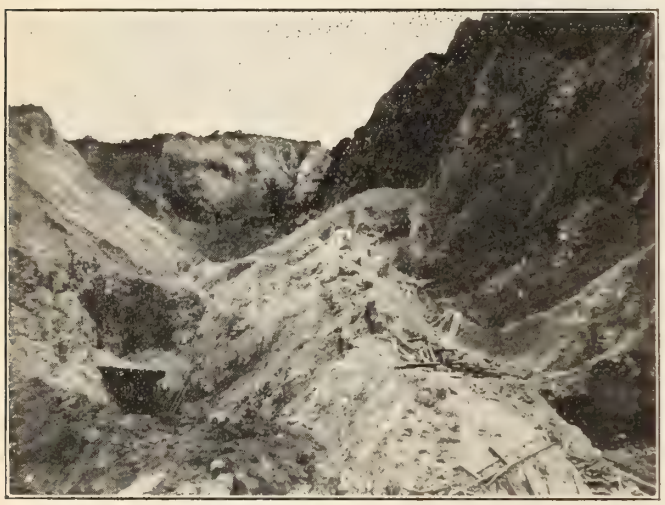
Steam is the motive power employed at the mine for all purposes, the fuel being lignite of fair quality railed from the collieries of the Waikato, some 70 miles distant.

The Metallurgical Works.—The metallurgical works comprise three separate mills, containing in all 330 stamps, rock-breakers, tube-mills, concentrating machinery, cyanide plants, melting, assaying, and refining plants, and all accessories. The three separate mills are known as the Martha (90 stamps), the Union (40 stamps), both situated at short distances from the mine, and the Waikino (200 stamps), situated at the village of Waikino, some five miles from Waihi.

The Martha, which may be taken as a type of the three mills mentioned, will be briefly described.

The ore railed from the mine is first dumped into an elevated hopper in the back of the mill. From this hopper the ore is screened on a "grizzly" and the coarse material passed through two rock-breakers of the Gates type—a large one and a small one—working in series.

The crushed ore from the breakers and the fines from the grizzlies fall on to a belt conveyor which delivers it into a series of bins located behind the stamps. The stamps are fed by Challenge ore-feeders with the broken ore from the bins mentioned. These stamps, each weighing 1,000 lbs., fall with a six-inch drop 103 times per minute, and have a duty of 3,794 tons per day. The ore is wet-crushed, the discharge screens of the stamper-boxes having a 10, 20 or 25 mesh, according to the tube-mill capacity available. The pulverized ore from the



OPEN CUT ON MARTHA LODE.

The clean-cut face is the footwall of the lode.

stamps is conveyed by launders to classifiers of the Spitzhasten type, the coarse material from these being subjected to further grinding in tube-mills.*

The product of these wet-crushing tube-mills is itself subjected to classification, the fines joining those directly obtained from the stamps, while the coarser sands are elevated back to the mills for further comminution and subsequent classification.

The whole of the pulverized ore from the stamps and the tube-mills is conveyed in launders to the amalgamating room. Here it passes over silvered muntz-metal tables, where recovery of that portion of the gold-silver which exists in a free state is effected by amalgamation with mercury.

Classification of the ore is the next process, and is effected in "Spitzkastens," the slimes, to which finely ground lime is added, settling in large steel vats, and the fairly clear overflow water returning for use in the stamp mortars.

The sands only are conducted in launders to the vanners, which are mainly of the Union, but partly of the Wilfley type.* The concentrates, which amount to 1.56% of the ore and carry 18.14% of its total value** are, together with those from the Union 40-stamp mill, railed to Waikino for treatment. Reference will be made later to the process employed in dealing with the concentrates at Waikino.

The sands deprived of their concentrates are carried along in launders and delivered through Butter's distributors to the cyaniding vats. Here they are subjected to the usual direct treatment, which for each charge takes about seven days. The vats are mainly about 22 ft. in diameter, and 4 ft. 6 in. in depth.

In the cyaniding of the slimes from the Spitzkastens the agitation method, coupled with the employment of vacuum filter frames or baskets, has superseded all other methods. In this process the liquid slimes are run into vats, where they are kept from settling by agitation with compressed air. Into these vats the baskets, hung from a travelling overhead crane, are lowered. On the application of the vacuum, each basket takes up its load of slimes practically free from water, and on being raised, conveys it to an adjoining compartment. Here the pulped slime is blown off, thoroughly disintegrated and mixed with cyanide solution, after which it passes into vats, and is there kept in constant agitation by compressed air. When the leaching of the gold-silver contents of the slimed ore has been completed, the leached slimes and the solution are transferred to vats, where the slime is extracted as pulp by baskets, and, after being washed free from solution, is blown off the baskets and sluiced into the tail race.

The method of the treatment of the concentrates at the Waikino Mill consists in further comminution of the material in tube-mills until it is reduced to an exceedingly fine slime. The slimed concentrates are then cyanided by a compressed air agitation method, a stronger solution of potassium cyanide being employed here than in dealing with the ordinary sands and slimes.

The gold and silver is in all cases recovered from the cyanide solutions by the usual method of precipitation on zinc in extractor boxes; partially spent sulphuric acid from the refining plant, to be later described, is employed instead of the usual roasting for the elimination of the zinc. The precipitated bullion, which on being melted is cast into thin, flat plates, is passed on to the refining works. According to assay, 89.0% of the total gold values of the Waihi ores, and some 70.3% of the total silver values, were extracted in 1907.



THE EDWARD VEIN—SEE PLAN—WAIHI MINE.

Vein is 30 feet wide here. It attains a maximum width of [illegible] feet and [illegible] throughout [illegible]

Power for both the Martha and the Union Mill is derived partly from water and partly from steam. The Ohinemuri River and one of its tributaries have separately been harnessed to supply power to the large Waikino Mill. This hydraulic power, however, is insufficient

*A special feature in the mechanism of the Waihi Company's tube mills are the "Honeycomb" liners—slabs of silicious sinter or hard chalcedonic quartz obtained in the vicinity of the mine being cemented into honeycombed steel frames.

*Twenty-three of these in the Martha Mill are Union and one Wilfley.

**1907 Annual Report of the Waihi Gold and Silver Mining Company.

to meet the ever-increasing demands, and steam is employed as at the other two mills. To the Waikino steam plant has recently been added a 2,000 horsepower producer gas plant, Waikato lignite being used in the manufacture of the gas. This gas power plant, which is in three units—one of 1,000 h.p. and two or 500 h.p.—is proving both economical and efficient.

In conjunction with the Waikino Mill are both a foundry and engineering works, and a saw-mill. The former is of considerable capacity, and turns out a great part of the new mining and milling machinery, and effects all the necessary repairs and renewals. Fine milling timber, both kauri and rimu, is derived from sev-



eral forest reserves which are in possession of the Company.

The Refining Works.—A plant for the refining of the whole of the Waihi Company's gold-silver bullion by the sulphuric acid process has recently been installed at the Martha Mill. The bullion in the form of thin plates is heated with concentrated sulphuric acid in three large iron crucibles, each holding 7,000 ozs. The mother liquid containing the silver, after being siphoned off into a settler, is passed on to a cistern, where it is diluted with steam and cooled. Here the silver sulphate crystallizes out, forming a thick incrustation on the sides and bottom of the cistern. This silver sulphate is reduced to the metal by the passage through it of a solution of ferrous sulphate, the silver precipitate being washed, dried, and melted into bars. The ferric sulphate formed in the re-action between the silver sulphate and the ferrous sulphate is again reduced to ferrous sulphate by the addition of metallic iron. The gold remaining in the three crucibles is brought together in the central one, and there receives a final heating with strong sulphuric acid to further purify it. The gold, now in a granular state, is washed, dried and melted into ingots, which range from .990 to .993 fine. A little copper is added if necessary to increase the malleability of the gold. Since the output per month is about 15,000 ozs. of gold, and from 120,000 to 130,000 ozs. of silver, the total weight of bullion handled in this period is between four and five tons.

As a by-product in the gold-silver refining process, a certain amount of silenium which occurs in the bullion is recovered. The last shipment of this element exported sold for about £80.

Cost of Mining, Treatment, Etc.

The total expenditure (£357,674) of the Waihi Company for the year 1907, when 356,974 short tons of ore were treated, gives the approximate cost per ton as under:—

	£	s.	d.
Mining—			
Stoping and general mining expenses....		7	2.36
Development work		1	4.52
Transport of ore to mills			3.67
Metallurgical treatment of the ore, from the initial crushing to the production of the refined gold and silver bars		7	11.39
Freight, insurance, and expenses of realising bullion			4.93
Repairs and renewals to plant, building machinery, and water-races			3.68
Export duty on gold, and rent paid to the N. Z. Government		1	0.08
Salaries, office rent, and miscellaneous expenses in New Zealand		1	0.95
Directors' fees, salaries and expenses in London			4.88
Total	£1	0	0.46

amount paid in dividends, bonuses, etc., up to the 31st December amounted to £2,871,328, or 45.64% of the total value of the gold-silver produced. The company's reserve amount at date mentioned stood at £140,000. In 1907 the total distribution to shareholders was 80% on the capital, or 8½% on present share values. Ore in sight at the end of the year 1907 was estimated at 1,299,979 tons, or about four years' supply at the present rate of milling. This calculated reserve exceeded that of the previous year by 270,321 tons. Its average value may be assessed at £2-14-0 per ton.

Certain of the figures just cited indicate that the prosperity of the Waihi Company is well assured for several years to come.

In speculating upon the future of the Waihi Mine, the following points are of interest:—

(1) All of the principal veins of the Waihi Mine exhibit a gradually increasing width without diminution in the tenor of the pay ore, when traced downward to the present lowermost level (850 ft.)



WAIHI GOLD MINING COMPANY'S VICTORIA MILL, WAIKINO.

Comprises 330 stamps, tube mills, concentration and cyanide plants; also foundry and engineering works and sawmill. The Government Railway passes in front of the mill.

Statistics and Future Prospects.

The total amount and value of the ores produced by the Waihi Gold Mining Company, Limited, from the date of its formation to the 31st December, 1907, is as under:—

	Tons (2,000 lbs.)	Yield.	Total.
To Dec., 1891 ...	(not recorded)	50,086	50,086
1892-1899 (incl.).	394,374	1,152,138	
For year 1900....	125,453	317,902	
For year 1901....	178,444	461,205	
For year 1902....	201,023	521,574	
For year 1903....	259,082	658,393	
For year 1904....	291,176	683,888	
For year 1905....	298,531	728,521	
For year 1906....	328,866	837,927	
For year 1907....	356,974	878,486	
	2,433,923 tons valued at		£6,240,034
Total value of output.....			£6,290,120

The Waihi Gold Mining Company, Limited, is capitalized at £500,000, in 500,000 shares of £1 each, which have a present market value of about £4,750,000. The

(2) In the neighbouring Grand Junction Mine boring has proved that high grade sulphide ore exists at a depth of 150 feet below the Waihi Company's lowest level (850 ft.)

(3) On the Talisman Gold Mining Company's property, some 8½ miles eastward from Waihi, rich sulphide ore in andesites is being mined at a depth of 2,000 feet below the outcrop of the Talisman vein. In the Waihi Mine the greatest vertical range yet exploited on the outcropping Martha vein is 1,055 feet.

(4) Since, as already mentioned in this paper, many of the veins in the Waihi Mine do not reach the surface, while some of the outcrop quartz has the character of sinter deposits, it may be inferred that there have been but little erosion of the surface and little removal of auriferous vein-stone since the formation of the lodes. Consequently there can have been only slight secondary enrichment by descending surface water. Thus it may be concluded that the present values of the lodes are practically original, and may be expected to continue to considerable depths.

These facts, taken in conjunction with the increasing output, augur favorably for the future of the great Waihi Mine in depth.

Annual Report of the Coal Mines Branch, Department of Public Works, Alberta, for the Year 1907.

The report of the Coal Mines Branch states that, with the exception of a short period of idleness following a general strike, the year 1907 was one of steady activity and substantial progress. The total output of coal was 32.47 per cent. greater than in 1906.

Year.	Output of coal in tons.	Per cent. increase over previous year.
1905	811,228	.....
1906	1,385,000	70.73
1907	1,834,745	32.47

The coal output for 1906 and 1907 is thus classified:

	1906. Tons.	1907. Tons.
Lignite	602,780	639,335
Bituminous	546,623	939,295
Anthracite	235,597	256,115
Coal used in coke production	103,936	112,887
Coke produced	69,844	73,782
Briquettes produced	.....	49,585

It will be noticed that for 1907, by far, the largest increase is assigned to bituminous coal. As the quantity of coal converted into coke is not materially larger than that recorded in 1906, it is evident that domestic household and industrial (other than metallurgical) markets absorbed the balance.

A summary of statistics for the two last years offers a fair means of estimating the growth of the industry:

	1906.	1907.
Number of new mines opened	16	35
Number of old mines reopened	..	2
Number of mines abandoned	2	6
Number of tons of coal produced	1,385,000	1,834,745
Number of tons of coke produced	69,844	73,782
Number of tons of briquettes produced	.....	49,585
Average number of persons employed inside the mines	2,000	2,700
Average number of persons employed outside the mines	800	900
Number of fatal accidents inside the mines	9	17
Number of fatal accidents outside the mines	1	2
Number of non-fatal accidents inside the mines	31	75
Number of non-fatal accidents outside the mines	..	11

While in 1906 there were 61 coal mines known to be in operation in 1907 there were 98 in all, of which 15 produced no coal during the year.

Coal is being mined in the south at many points along the Crow's Nest branch of the C. P. R., from Medicine Hat near the eastern boundary to Coleman near the western boundary. On the main C. P. R. line extension coal deposits are being worked at Canmore and Bankhead. In the Edmonton district numerous mines are in operation and at many outlying points remote from railways small mines, worked during the winter, supply local requirements.

put of about 1,500 tons per day, drawn from three veins. The briquetting plant installed by the Zwoyer Fuel Company, has been doubled in capacity and now produces 400 tons of briquettes per day. The anthracite breaker plant has been duplicated and other improvements made.

The H. W. McNeill Company, Limited, Canmore, has carried out large improvements. The main roads have been enlarged to allow the introduction of compressed air locomotives.

The International Coal and Coke Company, Limited, Coleman, has a daily output of 1,570 tons, which is soon to be increased. Two additional locomotives have been added to the haulage plant. Incandescent lighting has been introduced in the main gangway on No. 2 and No. 4 seams.

The Hillcrest Coal and Coke Company, Limited, Hillcrest, has installed a new fan to ventilate the whole of their mine. The capacity is 30,000 cubic feet of air per minute.

At the property of the **Maple Leaf Coal Company, Bellevue,** a new coal chute has been installed capable of handling 500 tons of coal per day. This mine is rated among the large future producers.

The reorganized **Galbraith Coal Company, Lundbreck,** has erected a tipple of 1,000 tons daily capacity.

Many other companies report progress.

Accidents.

All serious accidents in coal mines were carefully investigated during the year. Six lives were lost on account of a fire that started in surface buildings, but not a single fatal accident due to fall of roof or sides was reported. The number of accidents due to explosions of gas has been greatly reduced since the introduction of safety lamps into many of the mines. Accidents caused by mine cars were numerous, but in most cases not serious.

Many of the accidents reported are so slight as not to incapacitate the injured party for more than a few hours or a day at most.

Fatal accidents numbered 17 below ground, and two above. Serious accidents numbered 17 below ground and one above ground. Six of the serious accidents were due to falls of roof and sides, five to mine cars and three to explosions.

Taken in its entirety the list is by no means a large one, although the rate of fatalities underground per thousand men employed is excessively large, being 6.30 as against 4.5 for the preceding year. These high rates are of course due to the large number of mines opened, the crudeness of much of the mining and the extensiveness of the territory to be covered by the inspector.

Inspection.

Mr. Norman Fraser, Provincial Inspector of Mines, reports that he and his assistant made a continuous round of inspection of all the large mines and endeavored to visit the small outlying mines at suitable periods.

The use of locked safety lamps in mines where there is any danger of explosion from gas or dust has been enforced throughout the province. The introduction of

safety lamps has been opposed by some of the mines, but events have justified the measure.

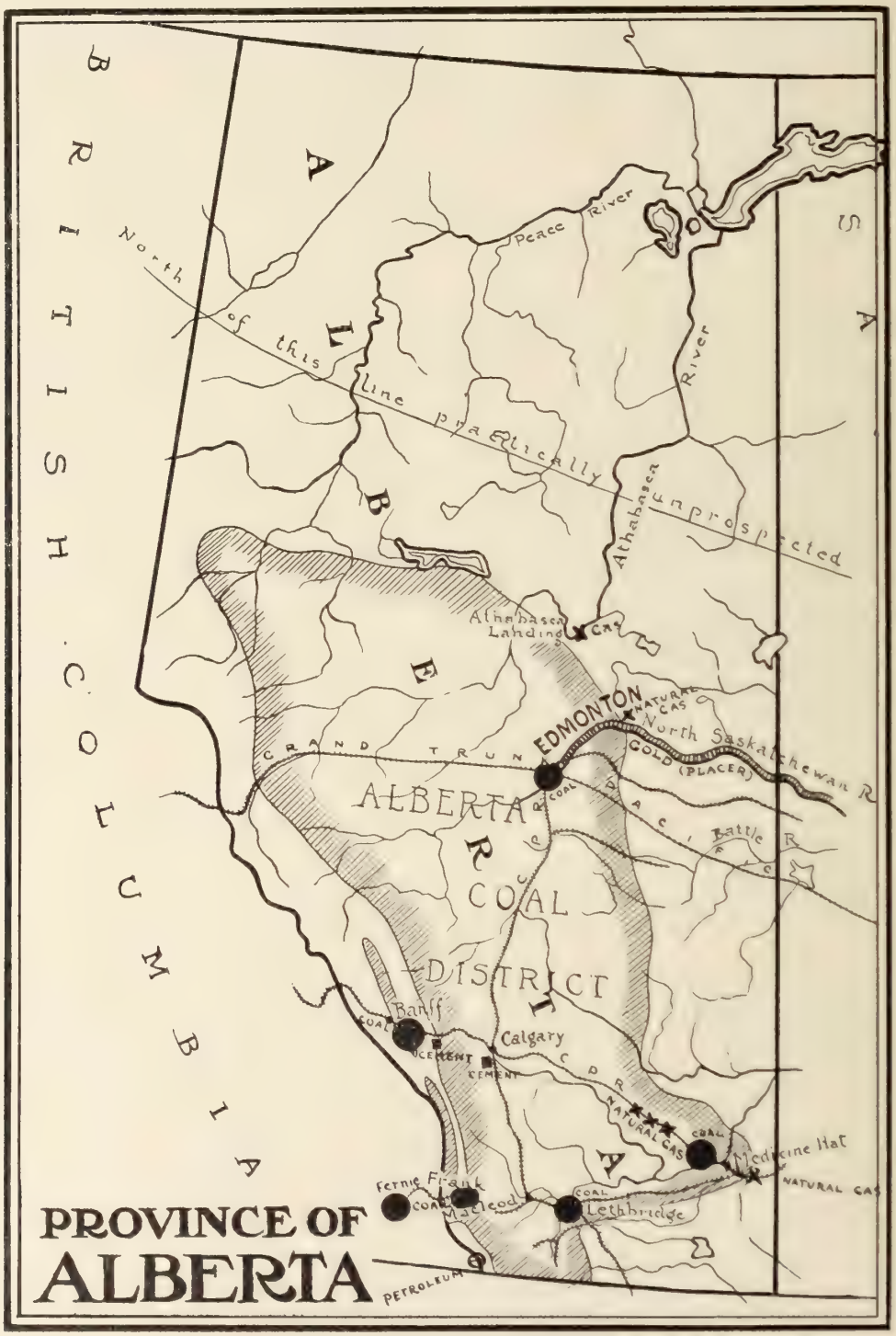
The inspector alludes to the absence of any provisions in the Coal Mines Act bearing on the regulation of the use of explosives in dry and dusty mines. The keeping of necessary plans, records, registers and report books, is to be enforced.

Four prosecutions for breaches of the Coal Mines Act were undertaken by the department and in each case a conviction was obtained. These are the first prosecutions undertaken in the Province under the Coal Mines Act.

COAL BRIQUETTING.

Development of the Industry in 1907.

The coal briquetting industry should make rapid progress in this country during the next few years, according to E. W. Parker, of the United States Geological Survey. Although the production in the United States in 1907—63,153 short tons, having a value at the plants of $244,942—seems insignificant when compared with the output of briquetting plants in Germany in 1906—about 16,000,000 short tons—it is of great importance as indicating that a beginning has been made



and that consumers are being gradually educated in the advantages of briquets for efficiency, ease of handling and cleanliness.

There were ten plants in operation in 1907, although one of these, at Pittsburg Landing, Cal., was burned in July and up to the close of the year had not been rebuilt. The location of the plants and the character of the fuel and binder used in the operation are reported by Mr. Parker in a paper just published by the Survey as an advance chapter from "Mineral Resources of the United States, Calendar Year 1907." In the introductory paragraphs to this report Mr. Parker says:

"There can be little doubt that the interest aroused through calling attention to the waste in the past of the country's natural resources, represented by the non-use of slack and culm produced in our coal mining operations, and the aggressive policy of President Roosevelt in seeking to throw light upon it and to correct the abuses into which we have largely unconsciously fallen, are, to a great extent, responsible for the present prospect of a development of coal briquetting as an important industry in the United States. It may not be long before the governments of the States, under whose jurisdiction the matter comes, will enact legislation against the accumulation of slack and culm heaps or their useless destruction by burning and prohibit this waste, as they have in some cases interdicted the waste of natural gas.

"Legislation which would prohibit 'shooting from the solid' at mines, when slack coal is not a marketable product, and which would provide penalties for excessive use of powder would have, as one result, a larger percentage of lump coal, and thus, in part at least, enable operators to assume the additional expense involved in the briquetting of such slack coal as is unavoidably produced."

ALBERTA GOVERNMENT EXAMINATION FOR MINE MANAGERS, ETC.

Examinations.

Two examinations for fire bosses and one for mine managers and pit bosses have been held at each of the centres in the province. A large number of candidates presented themselves for examination. In the fire boss and pit boss classes most of the candidates came up to standard but in the managers class the majority of the candidates did not come up to the required standard.

The following are the questions set at the examinations in Banff, November 28th and 29th; Frank, December 2nd and 3rd; and Edmonton, December 5th and 6th, 1907.

Fire Boss Examination.

Paper No. 1. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Coal Mines Act.

1. What is required by the General Rules re fencing of places not in use in the mine? (10)
2. What is required by the General Rules re fencing of shafts? (10)
3. What does the Act require in the way of manholes on planes worked by machinery? (10)
4. What does the Act require in the way of manholes for travelling roads when the travelling roads are worked by horses or other animals? (10)
5. What does General Rule 2 state regarding ventilation and the daily inspection of mines by a competent person? (20)
6. What does General Rule 3 state regarding the daily inspection of mines by a competent person? (15)
7. Give a full description of the daily duties of a fire boss and write out an imaginary report on the conditions prevailng in a mine. (25)

Fire Boss Examination.

Paper No. 2. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Ventilation.

1. What is meant by ventilation and why is ventilation necessary in a mine? (10)
2. Describe fully all the gases found in mines. (20)
3. What is the essential difference between a safety lamp and an open light? (20)
4. Under what conditions may a safety lamp become dangerous? (15)
5. Describe with sketches all the different methods you know for conducting air to the face of rooms or rock tunnels when the face of these rooms or tunnels has got a considerable distance away from a cross-cut. (15)
6. How would you proceed to examine a mine for explosive gas, say fire-damp? (15)
7. Is it possible to have an explosion in a mine when a safety lamp test does not show any indication of fire-damp? Explain fully. (15)

Fire Boss Examination.

Paper No. 3. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Practical Work.

1. Sketch and describe the mine in which you are at present employed. Show the direction of the ventilating currents and note the number of men employed and the average output for the day. (25)
2. In shot lighting a mine, what direction with relation to the direction of the air current would you travel in going your rounds? Give reasons. (20)

3. What precautions are necessary in handling dynamite and what precautions should a shotlighter take before firing any shot in a mine where safety lamps are used? (20)

4. Sketch and describe any two methods of timbering with which you are acquainted. (20)

5. Sketch and describe a good form of ventilation door to be used on a main haulage road. (15)

Fire Boss Examination.

Paper No. 4. Time Allowed, One Hour.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Arithmetic.

1. Divide 554.553 by 14.1 and multiply the result by the difference between three thousand and fifty-four and two thousand nine hundred and seventy-eight. (20)

2. What weight of coal will be produced from a level six feet high and eight feet wide and 1,000 feet long, supposing one ton in the solid occupies the space of 29 cubic feet? (20)

3. What is the area of an airway 6 feet 3 inches high by 10 feet 4 inches wide? (20)

4. If 100 cubic feet of air per minute is required for each man in a mine, how much air is required per minute in a mine working two shifts with 100 men on each shift? (20)

5. How many rails each 24 feet long will be required to lay double track in a main gangway 552 yards long? (20)

Pit Boss Examination.

Paper No. 1. Time Allowed, One and one-half Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Coal Mines Act.

1. What is the meaning of "mine" in the Coal Mines Act and to what mines does the Coal Mines Act apply? (15)

2. State all the provisions of the General Rules with regard to the inspection of mines. (20)

3. What are the provisions of the Act as to the use of safety lamps? (15)

4. What are the provisions of the Act governing the use of explosives below ground? (20)

5. What are the provisions of the Act regarding ropes and chains? (15)

6. State all the requirements of the Act regarding pit bosses and shotlighters. (15)

Pit Boss Examination.

Paper No. 2. Time Allowed, Two and one-half Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Ventilation.

1. Describe the various gases met with in mines, giving their chemical symbols and specific gravities. (20)

2. What methods would you adopt to obtain a large volume of air with the least possible mine resistance. (15)

3. What are the general requirements in regard to the use and construction of doors, overcasts and stoppings? (15)

4. Sketch and describe the water gauge and explain its use in ventilation. (15)

5. What dangers to life and property are to be guarded against when the ventilating current is produced by a furnace? (15)

6. In a mine the quantity of air passing is 25,000 cubic feet per minute, and the horse power of ventilation is 8. Find the water gauge. (20)

Pit Boss Examination.

Paper No. 3. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Practical Work.

1. Sketch and describe how you would lay out and work a 5-foot seam of lignite with a soft roof under a cover of 200 feet. (20)

2. Sketch and describe how you would sink and secure a shaft through 6 feet of quicksand at a depth of 60 feet. (15)

3. Sketch and describe how you would timber a level running in a five foot seam of coal, pitching at an angle of 45 degrees to the horizontal. The level has to be 7 feet high from the low side rail and the coal is of a soft nature. (15)

4. What is your experience with explosives in mines, and what improvements do you think can be introduced regarding the class of explosives to be used in gaseous mines? (20)

5. Explain with sketches how you would extract pillars in a flat lignite seam with a clay roof and also in a pitching vein with a hard rock roof. (15)

6. If a fire breaks out suddenly in the downcast shaft of a mine what means would you adopt to secure the safety of the men in the mine underground? (15)

Pit Boss Examination.

Paper No. 4. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Machinery.

1. What size and kind of rope would you put in a shaft for hoisting a load of 3 tons? Give weight of rope per foot and state size of pulley you would use for this rope. (20)

2. What is a syphon and what is the principle on which it works? (15)

3. Find the horse power of an engine having a 2 foot 6 inch stroke, diameter of cylinder 14 inches, effective steam pressure 60 pounds per square inch. (20)

4. Sketch and describe a fan suitable to ventilate a small mine. (15)

5. Describe with sketches some method of boring suitable for putting down test holes to a depth of 300 feet. (15)

6. What precautions would you take to ensure the safe and proper handling of boilers and what are the requirements of the Coal Mines Act regarding boilers? (15)

Pit Boss Examination.

Paper No. 5. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Surveying.

1. What is the cubic content of a mine car 5 feet long, 2 feet 2 inches wide and 20 inches deep. What weight of coal will this car hold when levelfull? (15)

2. What experience have you had in mine surveying? (15)

3. Plot the following survey.

(1) s. 20 degrees w. 220 feet.
(2) n. 40 degrees w. 140 feet.
(3) n. 20 degrees e. 220 feet.

Find the length and bearing of the closing line between points 1 and 3. (15)

4. What are the various reasons why plans should be kept of the workings of a mine? (20)

5. How do you put up points or plumbs to be used in keeping main roads straight in a mine? Describe fully how you line off these points afterwards, and take sights by them to the face of the road which has to be kept straight. (20)

6. What would be the cost of driving a tunnel 45 yards long, 8 feet wide and 7 feet 6 inches high, the price per cubic yard being $2.25? (15)

Mine Manager's Examination.

Paper No. 1. Time Allowed, One and one-half Hours.
The value attached to each question is given in brackets. Candidates must obtain 70 per cent. of the allotted marks to pass.

Coal Mines Act.

1. What is the interpretation of "mine" as laid down by the Coal Mines Act and to what mines does the Act apply? (15)

2. State fully the provisions and exceptions relating to the appointment of certificated managers. (15)

3. What are the provisions of the Act governing the use of explosives below ground? (20)

4. Name all the books, registers, reports, etc., required to be kept at the mine to comply with the Coal Mines Act. (20)

5. In what manner and to whom has notice of fatal and non-fatal accidents to be sent? What form is set out in the Coal Mines Act for the use of those making returns of facts relating to accidents or explosions? (15)

6. What does the Act say in connection with the appointment of inspectors by workmen? (15)

Mine Manager's Examination.

Paper No. 2. Time Allowed, Two and one-half Hours.
The value attached to each question is given in brackets. Candidates must obtain 70 per cent. of the allotted marks to pass.

Ventilation.

1. Name and describe the gases met with in coal mines and give the chemical symbol and specific gravity of each. (15)

2. Would there be any danger in a mine where the ventilating current contained 1 per cent. of CH_4 and also a considerable amount of fine coal dust? Give reasons for your answer. (10)

3. The old workings in a mine cover 20 acres, and the average height between roof and floor over this area is 2 feet. If this area is filled with CH_4 how much of that gas will be given off into the roadways of the mine if the barometer falls from 27.5 inches to 27 inches? (15)

4. The quantity of air passing in an airway 10 feet by 10 feet is 50,000 cubic feet per minute. In the airway there is a right angle bend and in coming against this bend the air is supposed to be brought momentarily to a standstill. Calculate the horse power lost. (15)

5. The air entering a deep dry mine is at all seasons completely saturated with moisture. At one season of the year the air entering is at 20 degrees F. and at another 80 degrees F. while the mine is at a constant temperature of 60 degrees F. Discuss the results, if any, affecting the safety of the mine due to these changes of temperature. (15)

6. If we have 25,000 cubic feet of air passing through an airway 5 feet by 6 feet, what quantity will pass through an airway 10 feet by 6 feet, pressure and length remaining the same? (15)

7. A pumping chamber in which works a steam pump has its only outlet to the upcast shaft. This shaft is 700 feet in depth and the pumping chamber is exactly half way down. Discuss fully how you would ventilate the chamber. (15)

Mine Manager's Examination.

Paper No. 3. Time Allowed, Three Hours.
The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Practical Work.

1. Is there any danger in the panel system of mining coal? Give reasons. (10)

2. Discuss the question of using coal cutting machinery under the various conditions under which coal is found in Alberta and show the advantage and disadvantages. (15)

3. Describe the general design of plant you would instal above ground to deal with a fairly large output of domestic coal and state the considerations governing your choice. (15)

4. Explain with the aid of sketches how the pressure of the overlying strata may be utilized in the getting of the coal. (15)

5. How would you proceed to open a mine after an explosion? (15)

6. How and of what material would you construct a dam in solid strata? What thickness of dam would you put in to withstand a head of 500 feet of water? (15)

7. Describe with sketches how you would work a flat lignite seam with a soft clay roof lying under 300 feet of cover. (15)

Mine Manager's Examination.

Paper No. 4. Time Allowed, Three Hours.
The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Machinery.

1. Sketch and describe the "Indicator." Draw a diagram taken from a condensing engine and point out the various features of the diagram. (12)

2. Explain fully the benefits of compounding engines and also the benefits of compressing air by different stages. (10)

3. What size ofp ump would you put in to pump 500 gallons of water per minute against a head of 300 feet? (15)

4. What are economizers as applied to boilers? Describe such an appliance. (12)

5. What are the various appliances which have been invented to prevent overwinding? Sketch and describe one of them. (15)

6. What size of hoisting engine would you put down to raise 800 tons of coal from a depth of 600 feet in 8 hours? (18)

7. What size of engine would you instal to work an endless rope haulage 6,000 feet long to deliver 800 tons in 8 hours hauling up a grade of 1 in 10? (18)

Mine Manager's Examination.

Paper No. 5. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Surveying.

1. Explain the difference between the transit and the miner's compass and discuss their respective uses in mine surveying. (10)

2. Plot the following survey and find the area of the enclosed figure:

Station.	Bearing.	Distance
1—2	N. 35.00 E.	147′
2—3	N. 59.15 E.	135′
3—4	S. 54.45 E.	237′
4—5	S. 36.15 W.	270′
5—2	N. 28.00 W.	323′

(20)

3. From a level, the course of which is N. 53.00 E. rooms are driven S. 68.00 E., width of room 28 feet and width of pillar 42 feet. What should be the distance on the level from centre to centre of rooms? (15)

4. If a triangle has one angle 61 degrees 10 minutes and another angle 62 degrees 15 minutes, what is the size of the third angle? (10)

5. Plot the following notes of a level book:

Back sight.	Intermediate sight.	Fore sight.	Distance in feet.
4.40	.....	6.35	230
5.20	.....	11.85	160
6.04	10.26	.....	190
.....	.....	13.95	180
5.12	.....	9.65	110
11.49	.....	4.92	225
13.96	7.50	.....	200
.....	.....	4.03	100

(20)

6. Explain the construction and use of the vernier as applied to surveying instruments. (15)

7. Draw to scale a mine car to hold one ton of coal when level full, mark on sides and show the car in plan, end elevation and side elevation. (10)

WAGES.

Fire bosses are still scarce although judging by the number of men coming up for examination for fire boss certificates the supply ought soon to reach the demand. In the early part of the year certain classes of mine workers obtained a slight increase in wages which increased scale is still maintained. The average coal diggers' wage, mining coal on contract, varies from $75.00 to $180.00 per month. The general wage schedule for day labor is as follows:

Inside Men.

		Hours.
Fire bosses	$3.50	8
Shot lighters	3.00	8
Bratticemen	3.00	8
Bratticemen helpers	2.50	8
Timbermen	3.00	8
Timbermen helpers	2.75	8
Drivers	2.75	8
Drivers, wet places	3.00	8
Team drivers	3.00	8
Tracklayers	3.00	8
Tracklayer helpers	2.75	8
Rock miners	3.50	8
Miners	3.00	8
Miners, wet places	3.50	8
Locomotive engineers	2.75	8
Switchmen	2.75	8
Chute loaders	2.75	8
Laorers	2.50	8
Timber handlers	2.75	8
Machine men	3.50	8
Machine men helpers	3.00	8
Switch boys	1.50	8
Door boys	1.00	8
Hoist men	2.75	8
Rope riders	2.75	8
Couplers, boys	1.50	8
Couplers, men	2.50	8
Pushers	2.50	8

Outside Men.

Pitheadman	2.50	10
Slate pickers, men	2.00	10
Slate pickers, boys	1.25	10
Car oilers, boys	1.25	10
Car oilers, men	2.00	10
Tally boys	1.25	10
Teamsters	2.50	10
Blacksmiths	3.50	10
Blacksmith helper	2.50	10
Mine carpenter	3.50	10
Mine carpenter helper	2.50	10
Car repairers	3.00	10
Power house engineers	3.50	10
Tipple engineers	3.25	10
Locomotive engineer	3.25	10
Locomotive helper	2.80	10
Firemen	2.50	8
R. R. car handlers	2.25	10
Fanmen	2.50	12
Outside laborers	2.00	10
Fan fireman	3.00	12
Lampman	2.50	12
Machinists	3.20	10
Machinists' helpers	2.50	10
Couplers	2.00	10
Sawyer	3.00	10

MINERAL WATERS.

Carbonate mineral waters, as agents in geologic changes, fall into two main subdivisions. Calcium is the important base in one, sodium in the other. Carbonic acid is usually present in sufficient quantity to form bicarbonates, thus making it possible for calcium, magnesius and iron to remain in solution. Upon evaporation calcium carbonate and magnesium carbonate are deposited, while ferrous bicarbonate is broken

up, and insoluble ferric oxide, or some insoluble hydroxide of iron, is formed by oxidation. The anhydrous resirue contains no bicarbonates except in some cases when sodium is predominant.

Carbonate waters carrying a relatively large proportion of silica are common. In volcanic waters, especially in geyser waters, the silica may reach half a gram to the litre, and sometimes even more. For instance, the waters of the Great Geyser, Iceland, carry 1,131 part sof solid per million. Of the total solids, silica constitutes 45.04 per cent.

PRODUCTION OF LEAD IN 1907.

Advance Statement by United States Geological Survey.

The total domestic production of refined lead in 1907, according to C. E. Siebenthal, of the United States Geological Survey, was 414,189 short tons, of which 314,241 tons was desilverized lead and 99,948 tons was soft lead. In 1906 the production of desilverized lead was 313,886 short tons; of soft lead, 90,783 tons; and the total refined lead was 404,669 short tons. The increase in production of 1907 over 1906 was therefore 9,520 short tons. The total for 1907 embraces all desilverized lead produced in this country and the pig lead recovered from the Mississippi Valley lead ores, but is exclusive of 9,910 tons of antimonial lead reported by refiners. Of the pig lead from Mississippi Valley ores, 29,809 tons were desilverized and are therefore not included under "soft lead."

The product of refined lead can not be apportioned according to the sources of ore from which it was derived, because the lead refineries treat also products that are secondary and are derived from diverse sources. The identity of ore, and thus its original source, is preserved only as far as the smelters. The following table, showing sources of lead produced in the United States, is therefore based on smelter figures. It includes "pig lead" reported by all known smelters running on Mississippi Valley lead ores and "lead" produced at all other known smelters in this country. No lead ores from the United States were treated elsewhere in 1907.

MANGANEZE ORES.

By E. C. Harder.

(Abstracted from Advance Chapter from Mineral Resources of the United States.)

Introduction.

The manganese-mining industry in the United States is at present, as for several years past, very small. In 1907 less than twenty manganese mines were in operation, and not half that number operated steadily. Of the large manganese districts of the United States, namely, the Valley and the Piedmont districts of Virginia, the Cartersville and the Cave Springs districts of Georgia, and the Batesville district of Arkansas, only the first two produced manganese ore in 1907. For this lack of activity there are three reasons—(1) the discontinuous and scattered nature of the deposits, (2) the crude mining methods naturally resulting therefrom, and (3) the low prices paid, which prevent attractive profits to operators under these conditions. All of the ore mined has to be either washed or sorted, and often both. Single pockets as a rule are small and are soon exhausted, so that the erection of expensive concentrating plants is discouraged, except in cases like the Crimora basin in Virginia, which is not at all typical of known American manganese deposits. In short, under present conditions domestic manganese can not compete with the foreign high-grade product. The larger part of the ore mined in this country was used in the brick, plant, and chemical industries, about one-sixth (947 long tons, valued at $6,747) being used in the steel industry, as against the 209,032 long tons imported for this purpose. The main reason for this seems to be that, although the demand in the former industries is limited, the prices paid are higher and ores can be used which would be undesirable in steel manufacture. Besides, the mining is on such a small scale that the supply does not run far ahead of the demand in these industries.

Uses.

The uses of manganese in the industries may be classified as follows: (1) Metallurgical, in the manufacture of alloys and in copper and silver reduction; (2) chemical, as an oxidizer and as a coloring material.

The manganese ores used in the manufacture of alloys are dependent in value on the percentage of metallic manganese present and on the absence of injurious substances like phosphorus and sulphur. The latter condition is especially true in the case of the alloys with iron. Spiegeleisen and ferromanganese are alloys of iron and manganese. The former contains below 20 per cent manganese, while the latter has a manganese content ranging from 20 per cent to 90 per cent, above which the alloy becomes unstable. Silicon and carbon are present in varying quantities. Spiegeleisen and ferromanganese are used in the manufacture of steel in the following ways—(a) as reducers of iron oxide in the final melting, in which case the manganese oxide formed goes into the slag; (b) as recarburizers of steel, in which case they contain considerable carbon; (c) for counteracting the effects of phosphorus and sulphur by the formation of manganese compounds with these elements; (d) in the manufacture of manganese steel, used for railroad and street-car rails on curves, for burglar-proof safes, for car wheels and for other purposes. The addition of small quantities of manganese gives to steel hardness, ductility and strength.

Manganese is also used to form alloys with copper, zinc, aluminium, tin, lead, magnesium, and silicon, and with combinations of these metals.

Manganese oxides are used to a slight extent in copper and silver reduction as a substitute for iron oxides.

As an oxidizer manganese oxide is used in the manufacture of chlorine, bromine, and oxygen, and of disinfectants like potassium permanganate; as a drier in paints and varnishes; as a decolorizer of glass, and in the Leclanche battery. In these cases the value of the ore depends on its available oxygen content—that is, on its percentage of pyrolusite or manganese peroxide.

As a coloring material manganese is used in calico dyeing; for coloring bricks, glass, and pottery, and in the manufacture of green and violet paints.

Compounds of manganese are used in a small way for medicine, and the mineral rhodonite, a silicate of manganese, is used rarely for ornamental purposes on account of its beautiful pink color.

Prices.

The prices of manganese ores used in the steel industry vary from $5 to $15 per long ton, according to the grade of the ore. They are governed by the following schedule of prices established by the Carnegie Steel Company:

Schedule of prices paid per ton of 2,240 pounds for domestic manganese ore delivered at Pittsburg or Bessemer, Pa., and South Chicago, Ill.

Prices are based on ores containing not more than 8 per cent silica or 0.25 per cent phosphorus, and are subject to deductions as follows: For each 1 per cent in excess of 8 per cent silica there shall be deduction of 15 cents per ton; fractions in proportion.

For each 0.02 per cent, or fraction thereof, in excess of 0.25 per cent phosphorus there shall be a deduction of 2 cents per unit of manganese per ton.

Percentage of metallic menganese in ore.	Price per unit, in cents. Manganese.	Iron.
Over 49	30	6
46 to 49	29	6
43 to 46	28	6
40 to 43	27	6

Ores containing less than 40 per cent manganese or more than 12 per cent silica or 0.27 per cent phosphorus are subject to acceptance or refusal at the buyer's option.

Settlements are based on analysis of sample dried at 212° F., the percentage of moisture in the sample as taken being deducted from the weight.

The manganese ores for oxidizing and coloring purposes are valued according to the quantity of manganese peroxide present, their consistency, etc., and prices range up to $25 per ton for the better grades of ore.

Production.

The production of manganese in 1907, amounting to 5,604 long tons, exceeded that of any year since 1902 except 1906. Toward the close of 1902 there occurred a sudden drop in production due to the cessation of mining operations in northwestern Georgia, after which there was a steady increase from the 2,825 tons produced in 1903 to 6,921 tons in 1906.

The bulk of the production was, as usual, in Virginia. South Carolina joined the ranks of producers for the first time since 1903, and produced more ore than in any previous year. Tennessee also showed an increase and a fair promise of becoming something more than a mere intermittent producer. California produced more ore than in any year since 1902. On the other hand, Georgia and Arkansas, which contain some of the most important manganese deposits in the country, were not on the list of producers of manganese in 1907, although Arkansas produced considerable manganiferous iron ore. The Utah mines, which gave fair promise for several years, were again idle.

OCCURRENCE.

Vermont.

Manganese ore occurs near the towns of South Wallingford and Brandon, in Otter Creek Valley, Vermont. In both localities the deposits are on the west slope of the Green Mountains at or near the contact of a "Lower Cambrian" quartzite, which forms ridges along the west slope, and an overlying limestone of approximately the same age, which underlies the valley to the west. The deposits are mainly brown hematite with subordinate manganese.

Virginia.

Manganese deposits occur in Virginia in the Piedmont region and in the Appalachian Valley.

The ore of the Piedmont region occurs in the James River Valley north and south of Lynchburg. There are a number of old mines in this district, but only one, that of the Piedmont Manganese Company, is at present producing. The deposits occur in residual clay and sand derived from ancient crystalline rocks. This material is still in place and often only partly decomposed, so that the texture and structure of the original rocks is clearly distinguishable. In general the ore occurs in nodular masses, ranging in weight up to 500 pounds and scattered through a yellowish-brown micaceous clay forming a nearly vertical layer between decomposed granite and quartzose mica schist residuum. The original nature of this ore-bearing layer is unknown.

Tennessee.

The manganese ores of Tennessee are the southward continuation of the Appalachian Valley deposits of Virginia. As in Virginia, they occur near the eastern border of the valley. The best known of the Tennessee deposits occur in the vicinity of Newport and Del Rio, Cocke County, and in Shady Valley, Johnson County.

The Yellow Springs mine, on English Mountain, 5 miles southwest of Newport, consists of an open pit in brown and red clays and sand, residual from Cambrian quartzite. The ore is both soft and hard, the former generally occurring in irregular pockets and seams associated with manganiferous clays, and the latter in small kidneys and irregular masses scattered through the clay and the soft ore pockets. There are numerous surface indications of manganese for several miles east of this mine, but little or no development work has been done.

Georgia.

Manganese ores occur in Georgia in three horizons: (1) The ancient crystalline rocks, (2) Weisner (Cambrian) quartzite, and (3) Knox (Cambro-Silurian) dolomite. The following is a general succession of rocks for northwestern Georgia from top to bottom: Knox dolomite; Conasauga shale; Beaver limestone; Weisner quartzite; Crystalline rocks.

In the crystalline area ores occur at Mount Airy, Habersham County; Bowersville, Hart County; Blue Ridge, Fannin County; and Draketown, Haralson and Paulding counties. All of these deposits are small, and none of them have been worked to any extent.

The ore is of four varieties: (1) Kidney ore, either amorphous, blue psilomelane, or a succession of concentric layers of psilomelane and crystalline and granular pyrolusite; (2) irregular masses, either psilomelane or a mixture of psilomelane and pyrolusite; (3) breccia and replacement ore with chert or sandstone fragments.

and (4) seams and irregular pockets of soft ore with local hard masses, a large portion of which must necessarily be lost during washing. The clays of the district are yellowish brown or red, according as they are derived from the Weisner quartzite or the Beaver limestone. The ores are generally associated with the former, and signs of manganese are present throughout the area covered by them, although only locally are there deposits rich enough to work. The breccia ores occur in residual sandstone or chert masses in the clays.

Arkansas.

Manganese ores of commercial importance have long been known in the Batesville district, in northern Arkansas. Smaller deposits occur in the southwestern part of the State, but these have not produced up to the present.

The Batesville district is located north of Batesville and east of Cushman, in Independence County. The country rock ranges from Cambrian to Carboniferous in age, and is in horizontal beds. The following is the general succession of rocks for the district:

General section in phosphate region of northern Arkansas.

Boone chert, St. Joe marble (Carboniferous).

Chattanooga shale and Sylamore sandstone (Devonian).

St. Clair limestone (Silurian).

Cason shale, Polk Bayou limestone, Izard limestone, Key sandstone (Ordovician).

Manganese ores occur in three different associations in the Batesville district, but all of them at very nearly the same geological horizon, namely, between the Boone chert and the Polk Bayou limestone, or locally the Izard limestone, where the Polk Bayou is absent. (1) The Cason shale locally becomes red and sandy and contains an abundance of small lenticular manganiferous iron nodules constituting a low-grade manganiferous iron ore deposit. This bed where exposed is 10 feet or more in thickness. (2) In most of the mines of the district the horizon normally occupied by the formations given above, between the Boone chert and the Polk Bayou limestone, is occupied by a manganese-bearing bed of varying nature, which appears to be partly residual from the erosion of other rocks formerly occupying this horizon and partly deposition of new material. This bed is also called the Cason shale, and although occupying a wider horizon is presumably equivalent to (1). It varies in thickness from a few inches to many feet because of the irregular surface of the underlying Polk Bayou limestone. The formation consists sometimes of clay with manganese ore fragments, sometimes of a solid bed of sandy, low-grade ore with associated sediments, and at other times of partial replacement of sediments. (3) The remaining forms of manganese deposits are associated with residual clays on the slopes of hills below the main manganese horizon above mentioned. These deposits consist of masses of psilomelane, pyrolusite, and braunite, and are reconcentrations from the manganese bed above. Only one mine in the district, the Cason, was a producer in 1907, but several deposits have been worked recently, among them the Reeves, Bales, Roach, and Meeker mines. The principal old mines are the Southern, Polk-Southerd, Turner, Adler, Trent, Baxter, and Montgomery mines.

COKE MAKING IN VIRGINIA.

As a result of the financial stress during the closing months of 1907, the production of coke in Virginia was less by 32,379 short tons, or 2.1 per cent. than in the preceding year, amounting to but 1,545,288 short tons in 1907, as against 1,577,659 short tons in 1906, according to E. W. Parker, chief statistician of the United States Geological Survey, whose report on the manufacture of coke in 1907 is now in press. Owing, however, to the better prices that prevailed during the greater part of the year, the value of the coke produced in 1907 shows an increase of $154,074—from $3,611,659 in 1906 to $3,765,733 in 1907. The number of establishments increased from 18 in 1906 to 19 in 1907, and the total number of ovens from 4,641 in the earlier year to 5,333 in the later. One establishment of 400 ovens was idle throughout the year. All of the coal used in the manufacture o fcoke in Virginia in 1907—2,264,720 tons—was unwashed; 1,271,518 tons was run-of-mine and 993,202 tons slack.

All the coking coals of Virginia are contained within a few counties in the extreme southwestern portion of the State, the coal fields being within the Appalachian province. The greater part of the development which has resulted in actual production during the last few years has been carried on in Wise County, on the Clinch Valley branch of the Norfolk and Western Railway. The coke in this district is the only coke made at the present time from coal mined exclusively within the State. There are two plants in Virginia, one at Lowmoor and one at Covington, the coal for which is drawn from the mines in the New River district of West Virginia. The coal for the ovens at Pecahontas and part of the Flat Top district of Tazewell County is obtained from mines whose workings extend across the State boundary line into West Virginia, and a part of this coal production should properly be credited to West Virginia. The openings of the mines, however, and the coke ovens are in Tazewell County, and it is customary to credit the coal as well as the coke to Virginia. The total production of coke in Wise County in 1907 amounted to 1,353,225 short tons, or 87.6 per cent of the total for the State.

It seems probable that the development work that has been in progress in the Black Mountain region of Lee County and in Wise County during the last few years will before long result in marked increase in the coke production of Virginia.

MOLYBDENUM.

Molybdenum is one of the rarer metals. It is most frequently found in granite in the form of the sulphide, molybdenite. The molybdates of iron, calcium, and lead, are also known as mineral species. Molybdenite often appears as a primary mineral in igneous rocks.

Molybdenite, the sulphide, is the principal ore of molybdenum. Wulfenite, the molybdate of lead, is a rare material; so also is powellite, calcium molybdate.

Molybdenite is usually a fairly pure compound, although a variety carrying 28.37 per cent. bismuth has been found, evidently a mixture of molybdenite and bismuthinite. In Canada molybdenite occurs in granite but also in veins cutting limestone and associated with pyroxene, calcite, quartz, mica, pyrite, etc.

BOOK REVIEWS.

GOLD AND SILVER.—Comprising an Economic History of Mining in the United States, etc. By Walter R. Crane, Ph.D., Instructor in Mining, School of Mines, Columbia University. 8 vo., X + 727 pages, illustrated. Cloth, $5 net (21s. net). John Wiley & Sons, New York.

The preparation of this work occupied two years. It is intended to form a part of the Economic History of the United States, which is to be published by the Carnegie Institution of Washington. Special permission was granted by the authorities of that institution to the author whereby publication of this volume was made possible.

The economic history of the precious metals is a subject at once complicated and extensive. The student is led into many by-paths. The halo of romantic interest that pertains to the earlier days of gold and silver mining must be a standing temptation to any writer.

However, Dr. Crane sticks manfully to his course.

Chapter I. delineates the bearing of precious metal mining upon the industrial growth of the United States. One sentence in this chapter, touching the relation of transportation facilities to mining development, has caught our eye:—"Gibbons regarded the Romans as the most remarkable road builders of the world, but the people of California had in fifty years done more road building within the confines of their State than had the Romans in their entire empire in fully ten centuries."

Chapter II. is an historical account of the discovery of gold and silver, followed by sketches of recent history of mining in each of the producing states and territories. The chapter concludes with a chronology of gold and silver mining.

Chapter III., on the occurrence and association of gold and silver, is a concise and useful summing up of the theory of ore formation, and the actual vein occurrences in the various states, etc. Gold in granite is given similar treatment.

In Chapter IV. the geological distribution of gold and silver is considered. Chapter V. deals, historically and descriptively, with the several methods of gold and silver ore mining. Chapter VI. takes up the extraction of the metals from their ores. The chapter is entitled "Extraction of Values." Mr. T. A. Rickard has alluded to the inaptness of word "values" when it is used in this sense. Here it is obvious that the word "metals" would be far more suitable.

Chapter VII. is mainly statistical.

Useful data are presented in tabulated form in six appendices. Diagrams and half-tones are interspersed throughout the text.

In addition to interesting material collected and used, and the satisfactory manner in which it is presented, we wish to commend particularly the plan of this work. The volume has a well articulated backbone.

LEAD AND ZINC IN THE UNITED STATES.—Comprising an Economic History of the Mining and Smelting of the Metals and the Conditions Which Have Affected the Development of the Industries. By Walter Renton Ingalls, Editor of the Engineering and Mining Journal. Illustrated. Cloth, 6⅛ x 9 ⅛. 368 pages. Price, $4 net. Hill Publishing Company, New York, 1908.

The author, than whom few are more competent to attack the subject, has endeavoured to describe the economic influences that have contributed to the development of the lead and zinc mining and smelting industries in the United States. But brief mention is made of early discoveries; but the economic forces, called into play by the growth of the nation and by modern requirements, are adequately outlined.

The book was prepared at the request of the Carnegie Institution of Washington, and with its assistance. It is to form a part of the Economic History of the United States, which is to be published by the Carnegie Institution.

In his introduction the author gives us a glimpse of the history of lead and zinc mining in the United States. "Up to 1901 it might have been possible to consider independently the lead and zinc industries of the United States, but from the economic standpoint it will never more be possible to do so."

From 1720 to 1820 the total production of lead amounted to about one-seventh the output of a single year at the beginning of the twentieth century. Southeastern Missouri was, up to 1821, the principal producer. From that year on to 1870, Wisconsin played the leading part. Since 1871, Utah, Nevada, Colorado and Idaho have become prominent.

Zinc was first made in the United States about 1838. It was produced from the red zinc ore of New Jersey, for use in the preparation of brass for standard weights and measures ordered by Congress. The process was not commercially profitable. Richard Jones, in 1850, began the manufacturing of zinc at Newark, N.J., but failed to make it pay. In the succeeding year Samuel Wetherill produced zinc oxide direct from the ore, on a commercial scale. In 1860 spelter works were put in successful operation. The Joplin mines became productive in 1873, and now are responsible for the greater part of the United States output.

Chapter I. deals with the occurrences of lead ore in the producing districts of the United States. Many useful facts have been compressed into this chapter. Chapter II. is a chronology, presenting the outstanding events in the history of lead mining. After the first date, 1621, is the following record:—"Lead was mined and smelted near Falling Creek, Va., to supply the local demand for bullets and shot. This was the first mining and smelting of lead in what is now the United States." After the last date, 1906, comes a paragraph that forms a striking contrast:"The Guggenheim interests practically secured control of the National Lead Company, thus bringing the major part of the lead-consuming industry of the United States into direct affiliation with the American Smelting and Refining Company."

Chapter III. is a strong and complete outline of the metallurgy of lead. Then follows a section on refining, marketing, and uses, after which the producing States are taken up in detail. Statistics of production, consumption, and prices, commercial conditions, the tariff on lead, labour and trade conditions, trade combinations, are the subjects of the concluding chapters of Part I., which comprises more than two-thirds of the volume.

Part II. treats the zinc industry in the same manner.

Mr. Ingall's point of view is wide and comprehensive, while his intimate knowledge of lead and zinc mining and smelting enables him to write profitably on the technical phases of his subject, his broad grasp of commercial conditions has made possible the excellent chapters on the economic phases. The plan followed has been wisely conceived and skillfully executed.

THE ANALYSIS OF ASHES AND ALLOYS. By L. Parry, A.R.S.M., Assayer and Consulting Metallurgist. 143 pages...Price 5s. net. .Published by "The Mining Journal," 46 Queen Victoria Street, London E. C., 1908.

Although of wider scope than indicated by its title, this book is intended to meet first the requirements of those who have to deal with "all sorts of complicated metalliferous mixtures . . . ashes, drosses, scrap, fume, precipitate, slag, etc."

Section I. embraces the determination of individual metallic elements; Section II., the analysis of various "ashes," or metalliferous residues; Section III. comprises a summary of methods and a descriptive list of chemicals, standard solutions, etc.

"Analysis of Ashes and Alloys" will be found most serviceable by practicing analysts. It is not intended for the instruction of beginners, nor for class-room use. The author's aim has been to condense a complete summary of his subjects into as brief form as practicable.

COAL. By James Tonge. 275 pages. Price, $2 net. D. Van Nostrand Company, 23 Murray and 27 Warren Streets, New York, 1907.

As a general introduction to a fascinating subject, Mr. Tonge's new book will, we think, serve a useful purpose.

There are many controversial and debatable points in the study of the origin, classification, and uses of coal. Many of these are touched upon by the author. The space limitations of a small elementary volume preclude the possibility of discussing these questions, and the author must, perforce, become somewhat dogmatic. Hence the reader may be given impressions that will be changed by later reading. This, however, is an unavoidable feature of nearly all elementary treatises.

The history, occurrence, mode of formation, paleobotany, classification, valuation, uses, waste, preparation for market, are among the subjects treated interestingly. Both British and foreign coal-measures are described. The economic and geographical importance of the world's coaling stations is treated. The book is well illustrated.

THE GEOLOGY OF COAL AND COAL-MINING.—By Walcot Gibson, D.Sc., F.G.S. Pages 341. Illustrated. Price 7s. 6d. net. Edward Arnold, 41 and 43 Maddox Street, London, W. 1908.

This is the first of a series of works on economic geology, to be published by Edward Arnold.

There is no study that has been more generally neglected than economic geology; and there is none that so little deserves this neglect. The prodigal waste of the world's mineral resources may justly be credited to our ignorance as nations and individuals of the necessity of conserving those resources.

Education by means of such books as Dr. Gibson's is the best and most direct means of awakening the public to the importance of developing wisely and utilizing sanely our mineral deposits. The general diffusion of a knowledge of economic geology is, therefore, the best preventive of waste and the most effective remedy for indifference.

The first chapters of the book take up the chemical, geological, and paleontological characteristics of coal. These are succeeded by chapters of much practical value, on prospecting and investigation. The coalfields of Great Britain then receive detailed attention, and in conclusion the coalfields of both hemispheres are describe dbriefly.

Throughout the volume, the close relation of geology to mining is impressed upon the reader. The interpretation of fossils is not neglected. Two particularly good chapters are given on the study of "exposed" and of "concealed" coalfields.

We have no hesitation in commending this excellent little volume.

EXCHANGES.

The Colliery Guardian, August 7, 1908.—The British Home Office some time ago appointed Mr. Ernest Aves to investigate the workings of the Wages Boards and Industrial Conciliation and Arbitration Acts of Australia and New Zealand. The Colliery Guardian describes Mr. Aves' report upon these subjects as being of great value.

These efforts at industrial legislation, remarks our contemporary, have been the result of a sincere desire to maintain a fair wage and to preserve industrial peace. They are fairly open to criticism because they are first attempts to meet a complicated industrial situation and because they have not been in service long enough to have lost their first imperfections.

Mr. Aves found that the original acts are in constant process of amendment to meet difficulties that are only revealed by actual working. Dissatisfaction on the part of employers and employees was evident everywhere. Nevertheless public opinion is increasingly opposed to a reversion to former methods of settlement of industrial difficulties and there is "a growing tendency in favor of facilitating voluntary agreements, and, failing these, of compulsory reference to a third party for investigation and report."

"The whole theory of compulsory arbitration," continues the Guardian, "stands or falls by the power of the Government to enforce its awards. This is where the New Zealand act has proved a lamentable failure." In the case of the Blackball coal mine, the miners openly defied the law because the award was not to their liking. The men remained on strike for two months after the dispute had been compulsorily settled, and the fines have not yet been collected by the sheriff. In this instance the law-breakers had the support of labor unions all over New Zealand.

Mr. Aves' conclusion is that the industrial disputes legislation in New Zealand and Australia has not been sufficiently successful to be taken as a model in other countries.

PERSONAL AND GENERAL.

Mr. R. R. Hedley, formerly of Hedley, B.C., visited Sudbury about the middle of August.

Mr. W. Dixon Craig, mine examiner for Drummond Mines, Limited, passed through Toronto on August 15.

Mr. G. F. Vasey, eastern representative of Jacques, Baszanger & Co., importer of diamond drill carbons and bortz, passed through Toronto on his way to Sudbury on August 21.

The Hon. William Templeman, Minister of Mines, accompanied by Mr. Reginald W. Brock, acting director of the Geological Survey, is visiting the mining districts of British Columbia.

Mr. John Kerr, the discoverer of the Tilbury oil field, died at Detroit on the morning of August 17, at the age of 45 years. Mr. Kerr sunk the first well on his own farm and had the courage to stick to the work in the face of ridicule and indifference.

Mr. John Ashworth, president of the Manchester Geological Society, has been spending some weeks in Canada. He will join the summer excursion of the Canadian Mining Institute on September 3 at Toronto. Ten years ago Mr. Ashworth examined and reported upon the Wright lead mine on Lake Temiscamingue.

Mr. Edmund B. Kirby, manager of the Federal Lead Company, Flat River, Mo., will retire on October 15th next, and devote his time thereafter to consulting work with headquarters at 701 Security Building, St. Louis, Mo. His successor to the management is to be Mr. H. A. Guess, who is at present milling superintendent of the American Smelters Securities Company.

INDUSTRIAL SECTION.

Solignum—Wood Preservative.—Solignum is a preservative for wood, stone and brickwork. It protects against decay, fungus, dry rot, insects and vermin, and the action of the weather. Solignum is not only a preservative, but a stain also. A gallon will cover 250 to 350 square feet. It does not increase the inflammability of the wood. For lengthening the life of all wooden structures and implements solignum has been used all over the world with excellent results. It is of especial service in preventing the decay of mine timbers. Its value in this respect deserves the attention of Canadian mining men. The British Agencies Company, 32 Church street, Toronto, are the sole agents for Canada.

Bulletin No. 27.—Improved Huntington Mills.—Power and Mining Machinery Company, Cudahy, Wis., U. S.A.

The Hutington mill is a centrifugal roller crusher and grinder. It can be used in place of stamp mills wherever hard or soft rock is to be reduced to a fineness of from 20 to 8 0mesh, but it is especially designed for crushing clayey ores and for the reduction and amalgamation of gold and silver ores.

While resembling the Cornish rolls in certain respects, the Huntington mill differs in that the rolls are set vertically and that they work in water. The advantages claimed for it are:

1. Low cost of machine.
2. Low freight charges.
3. Low cost of installation.
4. Easily accessible and cheaply replaceable wearing parts.
5. Low consumption of power.
6. Large discharge area, quick delivery, and minimum sliming.
7. Clean and efficient amalgamation.
8. Simplicity of construction and operation.

The 3′ 6″ Huntington should not be fed with ore larger than ½″ in diameter. The 5′ and 6′ machines can handle rock as large as 1″. But on account of the high speed at which the rollers are driven, the material fed should be as fine as practicable, and when coarse ore is fed the machine should be slowed.

The improvements effected by the Power and Mining Machinery Company are briefly these: In place of the wood frame for supporting the mill, a heavy cast iron base is supplied. This presents loss of alignment and does away with vibration.

The countershaft bearing is supported by a heavy bracket which is an integral part of the base.

The mortar has been strengthened all over and the centre cone is fitted with removable phosphor bronze bushing. The curb is a heavy casting made in halves securely bolted together and also batted by heavy through bolts to the motar and base. The shafts and roller spindles are forged from mill steel and are extra heavy. The gearing is cast from semi-steel and is extra heavy.

The roller heads are bored full length and have a large recess for lubricant on top. The scrapers are made reversible and of hard white iron, and are so shaped as to pick up readily the pulp from the bottom and throw it against the ring-die.

These and other improvements give color to the claims of the manufacturers.

The 3½″ Huntington mill is sectionalized for mule-back transportation. A rigid yoke with two bearings for the countershaft and a seat for the stepbox is substituted for the base casting.

Useful working diagrams of complete Huntington mill plants are included in the Bulletin.

The Grand Trunk Railway System have placed an order for a ten-ton hand power travelling crane with the Smart-Turner Machine Company, Limited, to be placed in their shops at Stratford.

The Smart-Turner people are also supplying an automatic feed pump and receiver for the heating system of Lansdowne school, Toronto.

Fourteen persons were killed and one injured in an explosion at the Washington "Glebe" Colliery, Durham, England, on February 20, 1908. The seam where the explosion occurred was moderately dusty and the workings were dry. The permitted explosive, Bellite No. 1, was used and fired by electric battery. The report of an investigation that followed the accident recommends that the necessity of further precautions be considered: (a) The necessity of shot-firers understanding fully all the conditions of danger, (b) the provision of some more satisfactory means of testing for fire damp; (c) the removal of any doubt on the subject of watering, removing or otherwise rendering harmless, coal dust on the floor of working places before shots are fired.

LIST OF CANADIAN OPERATING MINING COMPANIES

COMPILED SPECIALLY FOR THE CANADIAN MINING JOURNAL.

NOVA SCOTIA.

NOVA SCOTIA GOLD MINING COMPANIES.

Boston-Richardson Mining Company, Isaac's Harbour, Guysboro county.
Beaver Hat Golding Mining Company, Lower Seal Harbour, Guysboro county.
McDonald and Copeland, Forest Hill, Guysboro Co.
California Gold Mining Company, Cochran Hill, Guysboro county.
Wine Harbour Gold Mining Company ,Wine Harbour, Guysboro county.
Harrigan Cove Gold Mining Company, Harrigan Cove, Halifax county.
Dominion Mining Company, Tangier, Halifax county.
J. H. Anderson, Lake Catcha, Halifax county.
Oxford Gold Mining Company, Lake Catcha, Halifax county.
F. W. Hanwright, Lake Catcha, Halifax county.
Dixon Mine, Caribou, Halifax county.
Baltimore and Nova Scotia Mining Company, Caribou, Halifax county.
Consolidated Mines of Canada, Limited, Moose River, Halifax county.
Nova Scotia Gold Mines, Montague, Halifax county.
Chester Basin Gold Syndicate, Gold River, Lunenburg county.
Reardon Reeves Property, Gold River, Lunenburg Co.
Micmac Gold Mining Company, Leipsigate, Lunenburg county.
Eagle Mining Company Renfrew, Hants county.
Great Bras d'Or Gold Mining Company, Middle River, Victoria county.

GYPSUM.

The following is a list of those engaged in this very important industry:
The Wentworth Gypsum Company, Windsor.
The Victoria Gypsum Company, St. Anns, C.B.
The Maritime Gypsum Company, Amherst.
The Windsor Gypsum Company, Windsor.
The Nova Scotia Gypsum Company, Three Mile Plains.
Albert Parsons, Walton and Cheverie.
W. B. O'Brien, Noel.
Lorenzo Ettinger, Noel.
Lewis M. Smith, Cheverie.
George Hamilton, Noel.

PRINCIPAL OPERATING COAL MINES OF NOVA SCOTIA.

Dominion Coal Company, Glace Bay, C.B.
Nova Scotia Steel Company, Sydney Mines.
Cumberland Railway and Coal Company, Springhill, N. S.
Fundy, Lower Cove, N.S.
Port Hood Coal Company, Port Hood, C.B.
Inverness Railway and Coal Company, Inverness, C.B.
Mabou and Gulf Coal Company, Mabou Mines, C.B.
Joggins, Joggins, Cumb., N.S.
Scotia Coal Company, Maccan, Cumb., N.S.
Minudie Coal Company, River Hebert, Cumb., N.S.
Acadia Coal Company, Stellarton, N.S.
Nova Scotia Steel Company, Marsh Colliery, N.S.
North Atlantic Collieries, Port Morien, C.B.
Strathcona Coal Company, River Hebert, Cumb., N.S.
Gowrie Block House Company, Port Morien, C.B.
Sydney Coal Company, North Sydney, C.B.
Cape Breton Coal Company, New Campbellton, C.B.
MacKay Coal Company, North Sydney, C.B.
Chignecto, Chignecto, Cumb., N.S.
Intercolonial Company, Westville, N.S.

IRON.

Londonderry Iron & Mining Company, Torbrook, N.S.
Dominion Iron & Steel Company, Sydney, N.S.
Nova Scotia Steel & Coal Company, New Glasgow, N.S.

COPPER.

The Colonial Copper Company, Cape d'Or, N.S

ONTARIO.

ONTARIO MINES.

List of mining companies who make yearly returns to the Bureau of Mines:

ARSENIC FROM MISPICKEL ORE.

Canadian Gold Fields, Limited, Deloro, Ont.
Atlas Arsenic Company, Deloro.
Major R. G. Leckie, Sudbury.
Temagami Mining and Milling Company, Limited, Charles L. Beckwith, Pres., 346 Broadway, New York.

ACTINOLITE.

American Asbestos Company, New York.
International Asbestos Company, Ralph H. Waggoner, Pres., 309 Broadway, New York.

PORTLAND AND NATURAL ROCK CEMENT.

Belleville Portland Cement Company, Belleville.
Canadian Portland Cement Company, Marlbank.
Imperial Cement Company, Limited, Owen Sound.
Hanover Portland Cement Company, Limited, Hanover.
Lakefield Portland Cement Company, Limited, Lakefield.
National Portland Cement Company, Limited, Durham.
Owen Sound Portland Cement Company, Limited, Owen Sound.
Ben Allen Portland Cement Company, Limited, Owen Sound.
Superior Portland Cement Company, Limited, Orangeville.
Western Ontario Portland Cement Company, Limited, Atwood.
Ontario Portland Cement Company, Limited, Brantford.
Colonial Portland Cement Company, Limited, Wiarton.
Grey and Bruce Portland Cement Company, Limited, Owen Sound.

Sun Portland Cement Company, Limited, Owen Sound.
Estate of John Battle (Natural Rock), Thorold.
F. W. Schwendimann Cement Works, Limited, Hamilton.
Toronto Lime Company, Limited, 34 Yonge street, Toronto.
I. Usher & Sons Cement Works, Limited, Queenston.

GOLD.

St. Anthony Gold Mining Company, A. L. McEwen, Ignace, Ont.
Redeemer Mining and Milling Company, Gust. Larson, Mgr., Dryden, Ont.
Golden Reed Mining Company, Menso Gates, Pres., 402 Carrie street, Sault Ste. Marie, Mich.
Argenteuil Gold Mining and Milling Company, Limited. J. W. Lewis, Secy., Saginaw, Mich.
Rush Bay Golden Horn Mining Company, A. McMeekin, Box 24, Kenora, Ont.
Magpie Gold Mining and Development Company, Limited, Chas. M. Sayles, Secy., Sault Ste., Marie, Mich.
Camp Bay Mining Company, W. C. Penpz, DuBois, Pa.
Volcanic Reef Gold Mining Company, Limited, W. A. McBernie, Cannonsburg, Pa.
Detola Development Company, Chas. J. Rescher, Sec.-Treas., 919 Nicolas Bldg., Toledo, Ohio.
Olympia Gold Mining Company, Limited, Geo. H. Vernon, Secy., 308 National German-American Bank Bldg., St. Paul, Minn.
English River Gold Mining Company, Limited, James N. Walker, Secy., St. Catharines, Ont.
Imperial Gold Mines, Limited, Anthony Blum, 43 Tremont St., Boston, Mass.
Empire Gold Mining and Milling Company, Herman B. Singer, 375 Williams St., Buffalo, N.Y.
The Regina Gold Mine, Lt.-Gen. Sir Henry C. Wilkinson, K.C.B., Kenora, Ont.
Northern Light Mines Company, W. H. Barnhart, Secy., 629 Prudential Bldg., Buffalo, N.Y.
Big Dipper Mining and Milling Company, Limited, J. S. Waldron, Secy., 3771½ George St., Peterboro, Ont.
Ideal Gold Mining Company, Wm. Johnston, 109 Charlotte Ave., Detroit, Mich.
Craig Gold Mining and Reduction Company, H. B. Whitney, Pres., Phelps, N.Y.
Shakespeare Gold Mining Company, Limited, B. W. Dunn, Pres., Webbwood, Ont.
The Grace Mining Company, Limited, Andrew Holz, Secy., 872 Ellicott Sq., Buffalo, N.Y.
Sultana Gold Mining Company, Limited, John F. Caldwell, Director, Winnipeg, Man.

GRAPHITE.

The Ontario Graphite Company, Limited, Rinaldo McConnell, 175 Cooper St., Ottawa, Ont.
The Globe Refining Company, Limited, Rinaldo McConnell, 175 Cooper St., Ottawa.
J. G. Allan, 211 Bay St. S., Hamilton, Ont.

IRON.

Wilbur Iron Ore Company, Limited, F. V. Clisdall, Secy., 308 Stair Bldg., Toronto.
The Lake Superior Power Company, Sault Ste. Marie, Ont.
Mineral Range Iron Mining Company, Limited, H. L. Bingham, Secy., Bessemer, Ont.
The Breitung Iron Company, Edward N. Breitung, Sec.-Treas., Marquette, Mich.
Atikokan Iron Company, Limited, Fred Rodda, Port Arthur, Ont.
T. B. Caldwell, M.P., Lanark, Ont. (Calibogie Iron Mine.)
Williams Iron Mines, Limited, Chas. C. Williams, Secy. and Gen. Mgr., Sault Ste. Marie, Mich.
Canada Iron Furnace Company, Limited (Radnor Mine), J. M. Roy, Canada Life Bldg., Montreal.

IRON PYRITES.

The Nichols Chemical Company of Canada, Limited, C. U. Nichols, Pres., 25 Broad St., New York.
Lake Superior Power Company, Sault Ste. Marie, Ont.
Canadian Pyrites Company, Felix A. Vogel, 25 Broadway, New York.
Northern Pyrites Company, John Webb, Jr., Supt., Dinorwic, Ont.
Northland Mining Company, Limited, John Smallman, Secy., London ,Ont.

CALCIUM CARBIDE.

Ottawa Carbide Company, Ottawa, Ont.
Wilson Carbide Works, St. Catharines, Ont.

COPPER.

Massey Station Mining Company, Massey Station, Ont.
Consolidated Copper Company, Limited, Parry Sound.
Superior Copper Company, Sault Ste. Marie, Mich.
International Gold and Copper Company, Limited, 433 Mooney-Brisbane Bldg., Buffalo, N.Y.
Parry Sound Copper Mining Company, Otto Monson, Secy., St. Paul, Minn.
Martin Pattison & Co., Superior, Wis.
Black Bay Mining Company, N. B. Carlson, Secy., Willmar, Minn.
Calumet and Sault Ste. Marie Development Company, N. F. Kaiser, Secy., Calumet, Mich.
Hermina Mining Company, S. H. Bryant, Mgr., Massey Station, Ont.
Calumet & Algoma Mining Co., Lucas Herman, Secy., Calumet Mich.
Tip-Top Copper Mine, S. W. Ray, Port Arthur, Ont.
Madina Copper Company, Col., Cole Saunders, Pres., Eldorado, Ont.
Northern Ontario Consolidated Copper Company, T. E Crawford, Secy., Sault Ste. Marie, Ont.
The Cobden Mining Company, Sault Ste. Marie, Ont.

CORUNDUM.

Canada Corundum Company, D. A. Brebner, Secy.-Treas., 23 Scott St., Toronto.
The Ashland-Emery Company, Burgess Mine P.O., Ont.

FELDSPAR.

Kingston Feldspar Mining Company, Kingston, Ont.
Verona Mining Company, 706 Girard Trust Bldg., Philadelphia, Pa.
Charles Jenkins Feldspar Mine, Tishborne, Ont.

LIST OF OPERATING MINES AT COBALT

Standard Cobalt Mines, Limited, Thomas J. Maloney, Treas., 37 Wall St., New York.
Coniagas Mines, Limited, J. J. Mackan, Secy., St. Catharines, Ont.
Right of Way Mining Company, Limited, E. A. Larmouth, Secy.-Treas., Central Chambers, Ottawa.
Trethewey Silver Cobalt Mining Company, Limited, D. A. Brebner, Secy., 1428 Traders Bank Bldg., Toronto.

Buffalo Mines, Limited, Geo. C. Miller, 1012 Fidelity Bldg., Buffalo, N.Y.
Cobalt Silver Queen Mining Company, Limited, J. H. Stephens, Secy., 730 Traders Bank Bldg., Toronto.
Temiskaming and Hudson Bay Mining Company, Limited, F. L. Hutchinson, Secy., New Liskeard.
McKinley-Darragh-Savage Mines, W. L. Thompson, Treas., 100 Sibley Block, Rochester, N.Y.
Nipissing Mining Company, Limited, F. S. Whitworth, Cashier, Cobalt, Ont.
O'Brien Mine, Fred W. Rouse, Secy.-Treas., Cobalt.
Foster Cobalt Mining Company, Limited, Geo. Foran, Home Life Bldg., Toronto.
Colonial Mining Company, Limited, G. W. McCaskell, Mgr., Cobalt.
Kerr Lake Mining Company, J. A. Jacobs, 171 St. James St., Montreal.
Drummond Mines, Limited, J. Gouldthorpe, Acct., 70 Canada Life Bldg., Montreal.
Silver Leaf Mining Company, Limited, D. F. Maguire, Secy., 18 King St. W., Toronto.
Silver Bar Mining Company, Limited, J. H. Hubbell, Supt., Box 531, Cobalt.
Temiskamingue Mining Company, Limited, Norman R. Fisher, Gen. Mgr., Cobalt, Ont.
Cobalt Townsite Mining Company, Limited, B. W. Leyson, Supt., Cobalt, Ont.
Nancy Helen Mining Company, Limited, J. F. Black, Mgr., Cobalt.
Green-Meehan Mining Company, Limited, J. G. Langton, Secy., 28 Manning Arcade, Toronto.
Cobalt Lake Mining Company, Limited, D. B. Rochester, Man. Dir., Cobalt, Ont.
Crown Reserve Mining Company, Limited, J. Carson, Pres., Royal Bldg., Montreal, Que.
Chambers-Ferland Mining Company, Limited, Haileybury, Ont., Alex. Fasken, Secy., Toronto.
King Edward Silver Mines, G. W. McCaskell, Mgr., Cobalt, Ont.
La Rose Consolidated Mines Company, B. E. Rodden, Auditor, Cobalt, Ont.

LEAD.

Ontario Mining and Smelting Company (Holandia Mine), Chas. B. Wolfe, Treas., Fuller Bldg., New York.
The Stanley Smelting Works, R. E. Cushman, Secy.-Treas., Perth Road, Ont.

PETROLEUM.

Imperial Oil Company, Sarnia, Ont.
Canadian Oil Refining Company, Limited, B. Dunlop, Supt., Petrolia, Ont.
The Union Oil Company, Limited, W. P. Bull, Holiss & Wilson, Temple Bldg., Toronto.
Rainsberry & Co., Sarnia.

COPPER-NICKEL.

Canadian Copper Company, Copper Cliff, Ont. (International Nickel Company).
Mond Nickel Company, C. V. Corliss, Mine Supt., Victoria Mines, Ont.

PRESSED BRICK AND TERRA COTTA.

Beamsville Brick and Terra Cotta Company, G. Crain, Secy., Beamsville, Ont.
Don Valley Brick Company, Toronto.
Toronto Pressed Brick and Terra Cotta Company, Milton, Ont.
Port Credit Brick Company, Port Credit.
Brampton Pressed Brick Company, Brampton.
Ontario Paving Brick Company, Limited, West Toronto.
Terra Cotta Pressed Brick Company, Alfred Cornwell, Gen. Mgr., 1070 Bathurst St., Toronto.
Milton Pressed Brick Company, Limited, Milton.

SEWER PIPE.

W. J. Anthutle, 309 Cromwell St., London, Ont.
F. D. McFie, 316 Bunnell St., London, Ont.
Hamilton and Toronto Sewer Pipe Company, 77 York St., Toronto.
Dominion Sewer Pipe Company, Swansea, Ont.
Ontario Sewer Pipe Company, Limited, 60 Victoria St., Toronto.

SALT WORKS.

E. S. Henderson, Canadian Salt Company, Limited, Windsor.
Parkhill Salt Company, Parkhill, Ont.
Messrs. R. & J. Ransford, Clinton.
The Gray, Young & Sparling Company, Wingham, Ont.
George McEwan Salt Works, Hensall, Ont.
Exeter Salt Works Company, Exeter.
J. Tolmie, Ontario People's Salt and Soda Company, Limited, Kincardine.
Peter McEwan Salt Works, Goderich.
Carter & Kittermaster Salt Works, Moooretown.

TALC.

A. A. Robbins Mining Company, Chris. Henderson, Madoc, Ont.
Stephen Wellington, Madoc, Ont.

BLAST FURNACES.

Hamilton Steel and Iron Company, H. H. Champ, Secy., Hamilton, Ont.
Deseronto Iron Company, F. B. Gaylord, Mgr, Deseronto, Ont.
Canada Iron Furnace Company, J. J. Drummond, Midland, Ont.
The Algoma Steel Company, Limited, J. S. Wynn, Gen. Auditor, Sault Ste. Marie, Ont.
Ontario Iron and Steel Company, Welland.
Atikokan Iron Company, Port Arthur, Ont.

QUEBEC.

List of companies in the Province of Quebec in operation, or in position to work, with their addresses:

MAGNETIC SAND.

Quebec Iron Ore Company, 75 St. Peter St., Quebec.
H. C. Bosse, 112 St. Peter St., Quebec.
W. Robertson, 233 St. James St., Montreal.

CHARCOAL PIG IRON.

Canada Iron Furnace Co., The, Canada Life Bldg., Montreal.
John McDougall & Co., 597 William St., Montreal.

TITANIC IRON.

G. Gagnon, 87 Artillery St., Quebec.

OCHRE.

Canada Paint Company, Limited, 572 William St., Montreal.
Champlain Oxyde Company, Lucien Carignan, Three Rivers.
Thomas Argall, Three Rivers.

CHROMIC IRON.

Black Lake Chrome and Asbestos Company, Black Lake.
American Chrome Company, Black Lake.
Star Chrome Company, Colraine.
Canadian Chrome Company, St. Hyacinthe.

COPPER.

Eustis Mining Company, Eustis.
Nichol's Chemical Company, Limited, Capelton.
J. McCaw, Sherbrooke.
A. O. Norton, Coaticook.
G. E. Smith, Sherbrooke.
A. F. Foss, Lennoxville.

GOLD.

Cie des Mines d'or de Pontiac and Abitibi, Limited, Montreal.
C. A. Parsons, South Dudswell.
Louis Mathieu & Cie., Beauceville.
Louis Gendreau, Jersey Mills.
C. E. Kennedy, Beebe Plain.
Marsboro Gold Mining Syndicate, Sherbrooke.

GRAPHITE.

The Bell Mines, Buckingham.
Diamond Graphite Company, Buckingham.
Buckingham Graphite Company, Buckingham.
Calumet Mining and Milling Graphite Company, Calumet.

MANGANESE.

Magdalen Islands Development Company, Montreal.

ASBESTOS.

Bell Asbestos Company, Limited, Thetford Mines.
King Asbestos Mines, Limited, Thetford Mines.
Johnson Asbestos Company, Thetford Mines.
Beaver Asbestos Company, Thetford Mines.
American Asbestos Company, Limited, Black Lake.
Standard Asbestos Company, Limited, Black Lake.
Dominion Asbestos Company, Limited, Black Lake.
Union Asbestos Mine, Black Lake.
Megantic Asbestos Company, Black Lake.
James Reed, Reedsdale.
Broughton Asbestos Fibre Company, Limited, East Broughton.
Quebec Asbestos Company, East Broughton.
Eastern Townships Asbestos Company, East Broughton.
Frontenac Asbestos Mining Company, East Broughton.
Boston Asbestos Mining Company, East Broughton.
Asbestos Mining and Manufacturing Company, Chrysolite.
Asbestos and Asbestic Company, Danville.
R. H. Martin, New York, U.S.
Colraine Asbestos and Exploration Company, Limited, Colraine Station.
Premier Mining Company, Colraine Station.
Beauceville Asbestos Company, Beauceville.
Ottawa Asbestos Mining Company, Ottawa.

MICA.

Blackburn Bros., 46 Sussex St., Ottawa.
Wallingford Mica and Mining Company, 41 Duke St., Ottawa.
Wallingford Bros., Limited, 24 Central Chambers, Ottawa.
Fortin & Gravelle, Hull.
General Electric Company, Isabelle St., Ottawa.
Laurentides Mica Company, corner of Bridge and Queen, Ottawa.
Vavassour Mining Association, E. F. Nellis, 22 Metcalfe St., Ottawa.
Comet Mica Works, 398 Wellington St., Ottawa.
Lila Mining Company, D. L. McLean, 6 Sparks St., Ottawa.
Allan Gold Reefs Company, Limited, Victoria Chambers, Ottawa.
Webster & Co., 274 Stewart St., Ottawa.
Thomas J. Watters, Metropolitan Bldg., Ottawa.
Brown Bros., Cantley.
Lewis MacLaurin, East Templeton.
Richard Moore, Picanock.
Joshua Ellard, Picanock.
Glen Almond Mica and Mining Company, Buckingham.
Kent Bros., Kingston, Ont.
Henry F. Flynn, Maniwaki.
Chabot & Cie., Ottawa.
Gatineau Valley Mica Company, H. H. Moore, Cantley.
C. W. Berry, 424 McLeod St., Ottawa.
Calumet Mica Company, Bryson.
Cawood Mica Company, 38 Sparks St., Ottawa.

WHITE MICA.

Canadian General Mining Company, Limited, P.O. Box 253, Montreal.

PURCHASERS OF MICA.

Laurentides Mica Company, Limited, Bridge and Queen Sts., Ottawa.
Eugene Munsell & Co., 332 Wellington St., Ottawa.
General Electric Company, Isabella St., Ottawa.
Webster & Co., 274 Stewart St., Ottawa.
F. D. Moore, 354 Wellington St., Ottawa.
Ottawa Mica Company, Hull.
A. Roy Macdonald, Jr., 68b St. Urban St., Montreal.

PHOSPHATE.

J. F. Higginson, Buckingham.

FELDSPAR.

W. A. Allan, Victoria Chambers, Ottawa, Ont.

MAGNESITE.

E. J. Waters, 554 Rideau St., Montreal.

KAOLIN.

F. R. Lanigan, 23 Cote St., Montreal.

TALC.

C. V. M. Temple, 175 Spadina Rd., Toronto, Ont.

SULFATE OF BARYTA.

Canada Paint Company, 372 William St., Montreal.

COMBUSTIBLE NATURAL GAS.

Canada Gas and Oil Company, Three Rivers.

PEAT.

Imperial Light, Heat and Power Company, Limited, Liverpool, London and Globe Bldg., Montreal.

SLATE.

Rockland State Quarry, New Rockland.

FLAG STONES.

F. R. Bishop, Bishop's Crossing, Co. Wolfe.

CEMENT.

International Portland Cement Company, Limited, Hull.
The Lakefield Portland Cement Company, Limited, Pointe aux Trembles.
Vulcan Portland Cement Company, Limited, Longue Pointe.

GRANITE.

Stanstead Granite Quarries Company, Limited, Beebe Plain, Co. Stanstead.
S. B. Norton, Beebe Plain.
James Brodie, Graniteville, Co. Stanstead.
The Whitton Granite Quarry Company, St. Victor de Tring.
M. Fitzgerald, Sainte Cecile, Co. Compton.
Fortunat Voyer, Riviere a Pierre, Co. Portneuf.
Joseph Perron, Riviere a Pierre.
M. P. Davis, 48 Central Chambers, Ottawa.
The Laurentian Granite Company, Limited, Montreal.
J. A. Nadeau, Iberville.
Montfort Granite Company, Limited, Montreal.

BRICKS—(The principal companies).

Thomas W. Peel & Co., Montreal.
J. Burnet & Cie., Montreal.
Chs. Sheppard & Son, Montreal.
Joseph Bernier, Montreal.
Joseph Descarrie, Montreal.
Laprairie Brick Company, Limited, Laprairie.
Narcisse Blais, Quebec.
Paradis & Letourneau, Quebec.
Laliberte & Fils, Saint Jean Deschaillons, Co. Lotbiniere.
Victor Charland, Saint Jean Deschaillons.
D. G. Loomis & Son, Sherbrooke.
The Eastern Townships Brick and Manufacturing Company, Lennoxville.

LIME—(The principal companies).

Dominion Lime Company, Sherbrooke.
Cyrille Gervais, Montreal.
Olivier Limoges, Montreal.
Montreal Line Company, Montreal.

BUILDING STONE.

The Terrebonne Quarry Company, St. Francois de Sales, Co. of Laval.
The Louis Labelle Quarry Company, Limited, St. Francois de Sales.
Joliette Limestone Quarry Company, Joliette.
Standard Lime and Quarry Company, Joliette.
Frelighsburg R. and Quarry Company, Philipsburg, Mississiquoi.
Harrisson Quarry Company, Montreal.
Dominion Quarry Company, Montreal.
O. Limoges, Montreal.
Grondine Stone, Lime and Brick Company, Three Rivers.

COMPANIES USING CERTAIN PRODUCTS OF THE MINES TO BE MANUFACTURED IN THIS PROVINCE.

The Electric Reduction Company, Limited, Buckingham, ferrochrome and phosphorus.
The Chemical and Fertilizer Company, Buckingham, superphosphate.
Electro Manganese Reduction Company, Shawenegan.
Standard Chemical Company, Coaticook, acetate of lime.
The Standard Drain Pipe Company, Limited, St. Jean d'Iberville.
C. E. Dubord, Beauport, refractory clay.
Geo. Belanger, Beauport, refractory clay.
The Montreal Terra Cotta Company, Limited, Maisonneuve.

ALBERTA.

MINES OPERATED IN ALBERTA DURING 1907.

Canmore, H. W. McNeill Co., bituminous.
Lethbridge, Alta. Ry. & Irr'n. Co., lignite.
Clover Bar, Daly & Lindsay, lignite.
Clover Bar, Clover Bar Coal Co., lignite.
Namao, C. G. Carnegie, lignite.
Strathcona, Wetaskiwin Coal Co., lignite.
Namao, Frank Smith, lignite.
Strathcona, White Star Coal Co., lignite.
Lineham, Cooper & McPherson, lignite.
Cardiff, Cardiff Coal Co., lignite.
Medicine Hat, Crockford Bros., lignite.
Taber, Reliance Coal Mining Co., lignite.
Hillcrest, Hillcrest Coal and Coke Co., bituminous.
Edmonton, Wm. Humberstone, lignite.
Edmonton, Milner-Benner Coal Co., lignite.
Strathcona, Strathcona Coal Co., lignite.
Frank, Canadian-American Coal and Coke Co., bituminous.
Edmonton, Edmonton Standard Coal Co., lignite.
Carbon, Knee Hill Coal Co., lignite.
Lethbridge, James Ashcroft, lignite.
Lethbridge, Geo. F. Russell, lignite.
Pincher Creek, W. H. Wall, lignite.
Lundbeck, Galbraith Coal Co., lignite.
Medicine Hat, Fred Scott, lignite.
Lille, West Canadian Collieries, bituminous.
Clover Bar, Keith & Fulton, lignite.
High River, Wm. Ellis, lignite.
Gleichen, Blackfoot Indians, lignite.
Edmonton, Milner-Benner Coal Co., lignite.
*Namao, Watson Bros., lignite.
Lundbreck, Alberta Coal and Coke Co., lignite.
Lundbreck, Alberta Fuel Co., lignite.
Bankhead, Bankhead Mines, Limited, anthracite.
Taber, Duggan, Huntrods & Co., lignite.
Bellevue, West Canadian Collieries, bituminous.
Coleman, International Coal and Coke Co., bituminous.
Edmonton, Western Coal Co., lignite.
Clover Bar, Byers Bros., lignite.
Clover Bar, P. Ottewell, lignite.
Lethbridge, Royal Collieries, Limited, lignite.
Clover Bar, Byers Bros., lignite.
Strathcona, Fraser & Freeman, lignite.
Namao, Lindsay Bros., lignite.
*Carstairs, S. Downie & Sons, lignite.
Lethbridge, Diamond Coal Co., Limited, lignite.
Taber, Canada West Coal Co., lignite.
Taber, Domestic Coal Co., lignite.
Edmonton, Parkdale Coal Co., lignite.
Namao, Charles Carnegie, lignite.
Taber, Stevens Bros., lignite.
Three Hills, Three Hills Coal and Development Co., lignite.
Three Hills, Nichols & Bothamley, lignite.
Taber, John Howells, lignite.
Carbon, Dodds, Currie & Hoding, lignite.
Three Hills, Jarvis & Bowden, lignite.
*Three Hills, C. F. Bothamley, lignite.
*Medicine Hat, J. Evans, lignite.

*High River, C. E. McIntosh, lignite.
Nanton, B. Parton, lignite.
*Carbon, Carbon Brick and Coal Co., lignite.
Woodpecker, J. Marsh, lignite.
Edmonton, Ketchum Coal Co., lignite.
Burmis, Leitch Collieries, Limited, bituminous.
*Strathcona, Larry Garneau, Jr., lignite.
Edmonton, Rosedale Coal Co., lignite.
*Morinville, Alberta Coal Mining Co., lignite.
*Taber, Central Coal Co., lignite.
Taber, Fox & Simms, lignite.
Taber, Canadian Pacific Railway, lignite.
*Bellevue, Maple Leaf Coal Co., bituminous.
*Brant, S. Wadsworth, lignite.
Lethbridge, W. Stafford, lignite.
Bowville, Henry Therriault, lignite.
Reidhill, James Ashmore, lignite.
*Taber, International Land Development Co., lignite.
*Woodpecker, Thomas Patterson, lignite.
Woodpecker, John Marsh, lignite.
Namao, Namao Coal Co., lignite.
Three Hills, Geo. Watson, lignite.
Claresholm, W. J. Bell, lignite.
Pincher Creek, Scott & Maclane, lignite.
Pincher Creek, Pincher Creek Coal Mining Co., lignite.
Edmonton, United Collieries, Limited, lignite.
Edmonton, Frank Coal Co., lignite.
Tofield, P. F. Ingram, lignite.
Tofield, Tofield Coal Co., Limited, lignite.
Thigh Hill, S. J. Henry, lignite.
Grassy Lake, H. A. Driggs, lignite.
Burmis, East Crow's Nest Coal Co., bituminous.
Grassy Lake, Grassy Lake Coal Co., lignite.
*Edmonton, Dawson Coal Co., lignite.
Edmonton, Rupert's Land Coal Co., lignite.
Taber, Bucknam & Henderson, lignite.
Taber, Marsh Bros., lignite.
Taber, Imperial Coal Co., lignite.
High River, John Thorne, lignite.
Lethbridge, James Perry, lignite.
Magrath, Magrath Coal Co., lignite.

(*) Indicates "no coal produced."

MINES ABANDONED DURING 1907.

Mine No. 76—Operated by Alberta Coal and Coke Co., Lundbreck. Shaft on N.E. ¼ Sec. 25, Tp. 7, Rge. 2. west 5th Mer. Abandoned in December .1907.
Mine No. 18—Operated by Ramsey & George, Edmonton.
Mine No. 134—Operated by Samuel Wadsworth, Brant, Alto.
Mine No. 138—Operated by International Land Development Co.
Mine No. 57—Operated by W. R. Welsh, Pincher Creek. No. 2 tunnel abandoned December, 1907, by W H. Wall.
Mine No. 139—Operated by Thos. Patterson, Woodpecker.
Mine No. 118—Operated by John Evans, Medicine Hat.

MINES REOPENED DURING 1907.

Mine No. 57—Formerly operated by Wm. McFarlane, Pincher Creek. Sold to Western Oil and Coal Consolidated and leased by them to W. H. Wall. Released December 9, 1907, to Wm. R. Welsh, Pincher Creek.
Mine No. 70—Formerly operated by Riley & Thompson, High River. Reopened 1907 by Wm. Ellis, High River.

BRITISH COLUMBIA.

BRITISH COLUMBIA COAL MINES.

Western Fuel Co., Northfield Mine, Nanaimo, Thomas R. Stockett, George Wilkinson.
Wellington Colliery Co., Limited, Extension Colliery, Cranberry District, Andrew Bryden. Union Colliery, Comox District, John Matthews.
Macgowan & Co., Gilfillan Colliery, Wellington, John John.
South Wellington Coal Mines, Limited, Fiddick Colliery, South Wellington, Geo. Wilkinson.
Vancouver-Nanaimo Coal Mining Co., Limited, New East Wellington Colliery, Vancouver, J. J. Grant.
Nicola Valley Coal and Coke Co., Limited, Middlesboro Colliery, Coutlee, Alex. Fauls.
Crow's Nest Pass Coal Co., Limited, Chas. Simister, Gen. Supt., Fernie. Coal Creek Colliery, Coal Creek, Robert Strachan. Carbonado Colliery, Carbonado, Evans Evans. Michel Colliery, Michel, James Derbyshire.

METALLIFEROUS MINES OF BRITISH COLUMBIA SHIPPING IN 1907.

FORT STEELE MINING DIVISION.

North Star Mining Co., Limited, Kimberley, lead, silver.
Maurice Quain, Cranbrook, silver, gold.
Con. M. & S. Co. of Canada, Moyie, lead, silver.
Sullivan Group Mining Co., Kimberley, lead, silver.

GOLDEN AND WINDERMEDE MINING DIVISIONS

J. Lake, Athalmere, lead, silver.
J. C. Pitts, Windermere, lead, silver.
Geo. M. Willard, Wilmer, lead, silver.
Wm. Haupt, Wilmer, silver, lead.

NELSON MINING DIVISION.

Hall M. & S. Co., Nelson, silver, copper.
Hastings (B.C.) Explor. Sy., Ltd., Nelson, gold, silver
R. Legault, Nelson, copper, gold, silver.
Hall M. & S. Co., Nelson, silver, gold.
John Waldbeser, Salmo, lead, silver.
J. J. Malone, Nelson, gold, silver, copper.
The Fern Gold M. & M. Co., Nelson, gold, silver.
M. Davys, Nelson, copper, silver.
Frank Finney, Erie, gold, silver, lead.
Bell Bros., Salmo, gold, silver.
La Plata Mines, Ltd., Kokanee, silver, lead.
J. C. Devlin, Nelson, copper, silver.
Thos. Bennett, Nelson, gold, silver
Geo. T. Matthews, Salmo, gold, silver.
Duncan United Mining Co., Williams Siding, gold, silver, copper.
William Waldie, Nelson, gold, silver
Second Relief Mining Co., Nelson, gold, silver
Hall M. & S. Co., Nelson, silver, copper.
N. J. Cavanagh, Nelson, copper, silver, gold
D. Grobe, Ymir, gold, silver.
Ymir Gold Mines, Ltd., Ymir, gold, silver, lead
Patrick Daly, Ymir, gold, silver, lead

AINSWORTH MINING DIVISION.

Wm. English, Kaslo, silver, zinc.
H. J. Wright, Ainsworth, silver, lead.
Neil McKay, Kaslo, silver, zinc.
Bank of B. N. A., Kaslo, silver, lead.
A. C. Van Moerkerke, Whitewater, silver.
Dr. J. Gibson, Nelson, silver, lead.
C. E. Lyons, Sandon, silver, lead.
A. D. Wheeler, Ainsworth, silver, lead.
Eric Johnson, Kaslo, silver, lead.
Krao Silver-Lead Mining Co., Kaslo, silver, lead.
G. H. Barnhart, Nelson, silver, lead.
H. Giegerich, Kaslo, silver, lead.
H. Giegerich, Kaslo, silver, lead.
G. H. Barnhart, Nelson, silver, lead.
H. Giegerich, Kaslo, silver, lead.
Province Mines, Ltd., Kaslo, silver, lead.
Pacific Buillion Mining Co., Nelson, silver, lead.
Erl Syndicate, Nelson, silver, lead.
Whitewater Mines, Ltd., Nelson, silver, lead, zinc.

SLOCAN MINING DIVISION.

Brandon Bros., Silverton, silver, lead.
American Boy Mining Co., Spokane, silver, lead.
Arlington Mines, Ltd., Slocan, silver, lead.
E. Watson, Silverton, silver, lead.
C. & Clipper Silver-Lead Mg. Co., New Denver, silver, lead.
Brandon Bros., Silverton, silver, lead.
A. D. Coplen, Spokane, silver, lead.
Geo. T. Gormley, Sandon, silver, lead.
Laurenzo Alexander, Victoria, silver, lead.
J. Marten, New Denver, silver, lead.
A. H. Blumeneur, Spokane, silver, lead.
Olcott Payne, Nelson, silver, lead.
Idaho-Alamo Cons. Mines, Ltd., Three Forks, silver, lead.
Thos. Trenery, Kaslo, silver, lead.
L. Pratt, Sandon, silver, lead.
Geo. R. Petty, Three Forks, silver, lead.
G. W. Hughes, Kaslo, silver, lead.
A. H. Bigney, Sandon, silver, lead.
C. E. Lyons, Fernie, silver, lead.
J. T. Tipping, Slocan City, silver, lead.
Thos. Avison, New Denver, silver, lead.
G. H. Aylard, New Denver, silver, lead.
Vancouver Group Mining Co., Rossland, silver, lead.
Howard Thompson, Vancouver, silver, lead.
J. E. Tattersall, Slocan City, silver, lead.
E. Shannon, New Denver, silver, lead.
J. B. Faley, Slocan City, silver, lead.
Payne Cons. Mining Co., Sandon, silver, lead.
Queen Dominion Mining Co., Kaslo, silver, lead.
Rambler-Cariboo Mines, Ltd., Kaslo, silver, lead.
Reco Mining & Milling Co., Ltd., Sandon, silver, lead.
Cons. M. & S. Co. of Canada, Sandon, silver, lead.
The Ruth Mines, Ltd., Kaslo, silver, lead.
G. H. Aylard, New Denver, silver, lead.
J. B. Smith, New Denver, silver, lead.
Slocan-Sovereign Mines Co., New Denver, silver, lead.
G. W. Hughes, Kaslo, silver, lead.
Geo. McNicol, Slocan, silver, lead.
Vancouver Group Mining Co., Rossland, silver, lead.
S. Watson, Silverton, silver, lead.
The Washington Mine, Ltd., Kaslo, silver, lead.
Westmont Silver M. Co., Ltd., Slocan City, silver, lead.

LARDEAU MINING DIVISION.

Beatrice Mines, Ltd., Fargo, North Dakota, silver, lead.
Eva Gold Mines, Ltd., gold.
Edward Baillie Syndicate, Ltd., Nelson, silver, lead.
J. M. Miller, Seattle, silver, lead.

TROUT LAKE MINING DIVISION.

Ferguson Mines, Ltd., N.P.L., Ferguson, gold, silver, lead.
A. Hansen, Poplar Creek, silver, lead.

TRAIL CREEK MINING DIVISION.

Con. M. & S. Co. of Canada, Rossland, gold, silver, copper.
A. K. Heidler, Rossland, gold, silver, copper.
LeRoi Mining Co., Ltd., Rossland, gold, silver, copper.
LeRoi No. 2, Ltd., Rossland, gold, silver, copper.
Not given, gold, silver, copper.
Nest Egg & Firefly G. M. Co., Rossland, gold, silver, copper.
Con. White Bear M. Co., Ltd., Rossland, gold, silver, copper.

GREENWOOD MINING DIVISION.

H. A. Fuller, Spokane, Wash., gold silver.
W. T. McCluig, Sandon, gold, silver, lead.
G. S. McNicol, Phoenix, gold.
Wallace Mountain M. Co., Ltd., Greenwood, silver, lead.
B. C. Copper Co., Greenwood, gold, silver, copper.
B. C. Copper Co., Greenwood, gold, silver, copper.
B. C. Copper Co., Greenwood, gold, silver, copper.
B. C. Copper Co., Greenwood, gold, silver, copper.
Granby C. M. S. & P. Co., Grand Forks, B.C., gold, silver, lead.
Providence Mining Co., N.P.L., Greenwood, gold silver.
Dermody & Sater, Greenwood, gold, silver.
Vancouver & Boundary Ck. M & D. Co., Greenwood, silver, lead.
Skylark Development Co., Ltd., Phoenix, gold, silver, lead.
Con. M & S. Co. of Canada, Ltd., Phoenix, gold, silver, copper.
Alex. Miller, Greenwood, gold, silver, lead.

GRAND FORKS MINING DIVISION.

Dominion Copper Co., Boundary Falls, silver, copper. copper.
Dominion Copper Co., Boundary Falls, silver, copper.
Dominion Copper Co., Boundary Falls, gold, silver, copper.
Dominion Copper Co., Boundary Falls, gold, silver copper.
Granby Cons. M., S. & P. Co., Ltd., Grand Forks, gold, silver, copper.
W. A. Calder, Edgewood, silver, lead.

OSOYOOS MINING DIVISION.

H. A. Bowerman, Fairview, B.C., gold, copper.
Yale Mining Co., Hedley, B.C., gold.
Yale Mining Co., Hedley, B.C., gold.

SIMILKAMEEN AND VERNON MINING DIVISIONS.

J. Graham, Coutlee, silver, copper.

YALE AND KAMLOOPS MINING DIVISIONS.

Kamloops Mines, Ltd., Kamloops, gold, silver, copper.

ASHCROFT MINING DIVISION.

Not given, Ashcroft, copper.

LILLOOET MINING DIVISION.

Nat Coughlan, Lillooet, gold.

NANAIMO, ALBERNI, NEW WESTMINSTER AND VICTORIA MINING DIVISIONS.

Copper Cliff Mining Co., Heriot Bay, silver, copper.
Jas. Raper, Van Anda, gold, silver, copper.
Cornell Operating Co., Van Anda, gold, silver, copper.
E. M. Cox, Van Anda, gold, silver, copper.
Little Billy Operating Co., Van Anda, gold, silver, copper.
Tacoma Steel Co., Tacoma, Wash., U.S.A., gold, silver, copper.
Not given, silver, copper.
Britannia Copper Co., Ltd., Vancouver, B.C., gold, silver, copper.
Not given, silver, copper.
Not given, silver, copper.
Lenora Mine, Mount Sicker, gold, silver, copper.
C. H. Dickie, Duncan, B.C., gold, silver, copper.
Tyee Copper Co., Ltd., Victoria, B.C., gold, silver, copper.

SKEENA MINING DIVISION.

Awaya Ikeda & Co., Ltd., Ikeda Bay, Q.C.I., gold, silver, copper.
Brown Alaska Co., Hadley, Alaska, copper.

FOREIGN SOURCES OF SULPHUR.

Sicily.—For ten years prior to August, 1906, more than three-quarters of the sulphur industry of Sicily had been in the hands of the Sicilian Sulphur Company (Limited), of London, which virtually controlled the sulphur business of the world during that period. When the contract between the English company and the Sicilian sulphur producers came to an end on August 1, 1906, the former had a large stock of sulphur (estimated at 450,000 tons) on hand. To avoid a reduction in the price of sulphur, which would doubtless have involved disastrous results to the industry in Sicily, the Italian Parliament passed a law requiring all Sicilian sulphur to be sold through the "Consorzio Obligatorio," presided over by a royal commissioner, with Government resources behind it. At a conference between representatives of the Sicilian and the American sulphur interests held in July, 1907, the Italians insisted that American sulphur should be kept out of the European market. The American interests declined to entertain such a proposition, and in August, 1907, the situation in Sicily became decidedly threatening as a result of the Italian Government's attempt to reduce wages. About the same time it was decided to throw upon the American market the stock of sulphur accumulated in Sicily. With this end in view a first cargo of 3,000 tons was sent over, and it was understood that more was to follow. In October, 1907, prices on prime Louisiana sulphur to New York, Boston, and Portland were quoted at from $19 to $19.50 per long ton, a drop from $22.25, the price which had obtained during the early part of the year. Early in January of the present year, 1908, the Consorzio and the American producers came to an understanding and prices were again advanced to $22 per ton and have remained at this figure up to the time of writing (June, 1908).

In spite of the fact that quotations have been more than $22 per ton the greater part of the year, it is significant that the exportation of Sicilian sulphur to the United States has shown a constant and marked decline. Four years ago the importation of Sicilian sulphur amounted to more than 100,000 long tons. With the growth of the Louisiana sulphur industry, Sicilian sulphur in the United States has become almost a negligible quantity, as will be seen from the importation from Sicily of but 3,393 long tons in 1907. The following table, reported by Messrs. Emil Fog and Sons, of Messina, of exports of sulphur from Sicily, by countries, during the past four years, indicates the falling off in exports to the United States. This statement shows that 9,476 long tons were shipped from Sicily in 1907, but only 3,393 tons reached the United States during that year. Of the 9,476 tons shipped to this country in 1907, 8,598 tons were best unmixed seconds and 878 tons were refined sulphur.

ABRASIVE MATERIALS IN THE UNITED STATES.

Production in 1907.

The domestic abrasive material industry was in much better condition in 1907 than in any previous year, according to a report by W. C. Phalen, just issued by the United States Geological Survey as an advance chapter from "Mineral Resources of the United States, Calendar Year 1907."

The total value of all the natural abrasives produced during the year—including millstones and buhrstones, grindstones and pulpstones, oil stones and scythe stones, corundum and emery, abrasive quartz and abrasive feldspar, garnet, infusorial earth, tripoli and pumice—was $1,680,737. Compared with the value of the output for 1906—$1,473,393—this is an increase of $207,344. There was also a large increase in the production of artificial abrasives—carborundum, alundum and crushed steel—14,632,000 pounds, valued at $1,027,246, having been produced in 1907, as compared with 11,774,300 pounds, valued at $777,081, in 1906, a gain of $250,165. The total gain in value of abrasives of both classes was therefore nearly half a million dollars; there was, however, a decrease in value of imports of natural abrasives of $155,824, making a net increase in the domestic consumption of abrasives of all kinds for the year of $301,685, as compared with an increase of $376,437 in 1906.

Natural abrasives were produced in 23 States in 1907, as compared with 25 States in 1906.

The following table shows the value of the different kinds of abrasives produced in the United States in 1906 and 1907.

Value of Abrasives Produced in the United States in 1906 and 1907.

	1906.	1907.
Oilstones and scythe stones	$268,070	$264,188
Grindstones and pulpstones	744,894	896,022
Buhrstones and millstones	48,599	31,741
Pumice	16,750	33,818
Infusorial earth and tripoli	72,108	104,406
Abrasive quartz and feldspar	121,671	126,582
Garnet	157,000	211,686
Corundum and emery	44,310	12,294
Artificial abrasives	777,081	1,027,246
	$2,250,474	$2,707,983

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Halifax.

Mr. Franklin Playter, of Boston, who is the treasurer and general manager of the Boston-Richardson Gold Mine, has given out a statement for publication. In the summer of 1907 the company commenced building and equipping large additions to their plant. This involved heavy expenditure and large obligations. The bulk of the ore mined carries not more gold than $3.00 per ton. To work this at a profit the large plant was essential. The financial depression made the company's creditors urgent in their demands. The mine, whilst it is easily able to produce many times the requisite amount of ore to pay off all obligations, cannot do this in a few months. The treasurer advanced $15,000 of his own money, but this was insufficient to tide over the difficulty. Hence the company has been placed in the hands of a receiver.

THE BOSTON-RICHARDSON.

Goldboro.

A correspondent has provided the Canadian Mining Journal with a constructive suggestion as to the manner in which the Government can most profitably assist the Boston-Richardson Mine, which has recently gone into the hands of a receiver.

The mine is in good shape physically. If the management could be relieved temporarily from the burden of accrued liabilities, and could be supplied with, say, $20,000, for current operating expenses, then success is a moral certainty.

As a guarantee for any money advanced there is a reserve of 18,000 tons of ore, broken in the stopes, which will yield a net profit of at least $1.00 per ton.

There is also a live contract for the arsenic contents of the concentrates. This contract, despite the low current prices paid for arsenic, yields a net profit of $2,000 per month. The material accumulated in the tailing pile will supply shipping material for at least two years. This contract has been arranged recently. Fifty tons of arsenic concentrates is the monthly output.

If the Government, after due investigation of the above statements, would guarantee an issue of Receiver's Certificates for the necessary amount, the money could be raised with no difficulty.

The mine, as stated above, is in excellent shape. The plans for enlarged plant have been almost carried out. New machinery is on the ground with which a capacity of 8,000 tons of ore per month will be reached. The mine is well developed for this production. The costs per ton, during the last eight months, were below $1.80 per ton.

Considering all these facts and the additional fact that the closing of the Boston-Richardson will be of incalculable injury to the Province, it is not asking too much of the Government to request that an adequate sum of money be appropriated as promptly as possible.

The Government need have no fear of buying a pig in a poke. The amplest investigation will be welcomed.

Glace Bay—August 19.

Things have been rather slack around the collieries during the month of August. The usual succession of picnics and holidays have demoralised the routine and very considerably reduced outputs, which will be much lower than they have been throughout the preceding months of this year.

As announced some time ago, Mr. Charles Fergie has resigned the position of Superintendent of Mines for the Dominion Coal Co., and, following on this, several changes and promotions have taken effect in the official staff. Mr. Richard Kirby, late of England has been appointed Mining Engineer to the Coal Company. The whole of the mines are now separated into three districts, each of which will be in charge of a Divisional or District Superintendent, reporting directly to the General Manager. Mr. Alexander McEachern, the late Manager of Reserve Mines, is promoted to be District Superintendent of No. 1 District, comprising Mines Nos. 1, 5, 10 and 8. No. 2 District, comprising Mines Nos. 2, 9 and 7 remains as before under the superintendence of Mr. Norman MacKenzie. Mr. Peter Christianson is District Superintendent of District No. 3, which comprises Nos. 6, 3, 4, 12 and 14.

The North Atlantic Collieries Co. have decided to sink a shaft to the Blockhouse Seam at Port Morien, which they have just proved by a borehole. Our metropolitan newspapers gave prominence to the fact that the Blockhouse Seam had been "found." We did not know that it had ever been lost. Surely in its old age the Blockhouse is not going to play hide and seek like the giddy "Mullins" seam.

The Town of Glace Bay has acted with commendable promptitude in answer to the appeal of the Mayor of Fernie for funds to relieve the distress caused by the recent forest fires. The Mayor called a public meeting, and it was decided to send $1,000 and collect the money afterwards, and this was done. The impulsive generosity of mining populations is proverbial. They realize that some day they themselves may have to ask outside assistance. The city of Sydney is still considering "ways and means," and many of its citizens feel that their city has been outdone by its neighbor, and feel ashamed.

In a recent conversation with a Sydney newspaperman the president of the Dominion Coal Company recalled the fact that when he first took charge of the Coal Company the output of that corporation was in the neighborhood of 2,000,000 tons per annum, and that during the seven years which have since elapsed this output has been raised to 4,000,000, or figures in that neighborhood. Mr. Ross went on to say that within the next septennial period he anticipated an equally great advance in outputs. This would mean that in 1915 the output of the Coal Company's mines may be around 8,000,000 tons, or equivalent to the present total annual production of Canada. Coming from such a man of deeds as the president of the Dominion Coal Company this is a very pregnant prediction, and its true significance requires a little study to become fully apparent. An increase in outputs of 4,000,000 tons in seven years would mean a capital outlay of between ten and fifteen million dollars in the development and equipment of new mines, the provision of rail facilities and rolling stock, of new coal freighting steamers and loading and discharging plants. It would mean the doubling of the present mining population with all the attendant growth that comes with increase of population. It means the opening up of new avenues of work, and wealth and promotion for the people of the "Far East" of Canada.

Although over 300 years have elapsed since the pioneers of civilization came to Cape Breton, this island is only jut coming into its own, for there never was anything phenomenal about Cape Breton. Somehow progress in the East seems to be slower than in the West, but such growth as we have is solid as it is slow. Although in the rush for the wealth of the West, this corner of the Dominion has been overlooked, yet we have our compensations. Our climate is equable, we are out of the hurricane belt, cataclysms and earthquakes never trouble us; floods and fires and blizzards and other vagaries of Nature, such as vex the untamed West, come but once in centuries to this island, and although Cape Breton is not exactly the land of the Morning Calm, yet we have some advantages and compensations that make up for a less spectacular wealth and a growth that is slower than that of the West.

It is rather a coincidence, in the light of to-day, that Sydney might have been named Pittsburg. This was the name chosen for it by Governor DesBarres when Sydney was laid out by British soldiers in the days of the Georges. Some day it may rival in importance its Pennsylvania cousin, who can tell.

Stirred to definite action by the dreadful loss of life which marked the year 1907 in the mining annals of the United States, the Government of that country has appropriated the sum of $150,000 to establish experimental galleries and rescue stations in the coal regions of Pennsylvania and Virginia, and has called a convention of mining experts from Europe to meet in Pittsburg on September 1st.

The "Montreal Gazette" in commenting editorially on this action of the authorities in the States says: "The experimental work which is to be inaugurated at Pittsburg, dealing as it will with conditions similar to those to be found here, should therefore prove of decided value to the Canadian miner of the future. The courtesies of the United States Bureau of Public Documents seems to know no international boundaries, and we have no doubt that the monthly bulletins of progress that are promised by the new Bureau of Safety will be welcomed in Canada as additions to existing Canadian literature on this general subject." But the "Gazette's" comment is open to misapprehension. Are Canadian mining conditions similar to those in the United States? Does the "Gazette" know that the rate of fatalities in the mines of the United States is the highest in the world, and that the same rate in the mines of Nova Scotia is the lowest? We do not think that the public press of Upper Canada realizes the status of Canadian coal mining. To a Canadian mining company belongs the honor of having had the courage and the humanity to erect the first completely equipped "Rescue Station" on this continent. The Dominion Coal Company have had such a station for a year, and they have at the present time 39 complete sets of Draeger apparatus, housed in a brick building, with all the accessories of a modern rescue station, They have also a practice building, in which men are trained to wear the apparatus and work with it under conditions closely approximating to those underground, and in entirely unbreathable atmospheres. They employ a paid instructor specially engaged in England, and the work of training men is continuously going on, necessitating constant expenditure on oxygen and other supplies.

We think also it is fair to point out that the pioneer of experimental work of the nature to be undertaken by the United States Bureau is an Englishman, Mr. W. E. Garforth, of the Normanton Collieries, Yorkshire. Mr. Garforth for many years, entirely at his own expense, has carried on experiments of a costly and extensive nature to determine the explosive properties of coal dust, the effect of detonation and mine blasts on the flame of safety lamps, and he is the inventor of an approved type of oxygen breathing apparatus. Recently the British Home Office granted Mr. Garforth a subsidy to aid him in his valuable work, and the most accurate and up-to-date information on the subject is to be found in the British Blue Books and the Transactions of the English Institution of Mining Engineers. It may be of interest to remark that the original prototype of oxygen regenerative breathing apparatus intended to facilitate rescue work in mines was invented twenty-seven years ago by Mr. Henry Fleuss, of Newcastle-on-Tyne, and this apparatus, very little modified, is manufactured at the present time by Siebe-Gorman of London.

As has been previously pointed out in the columns of the Canadian Mining Journal, the provision of property equipped rescue stations and the training of men to act as special rescuers is one that is national in its character. This fact has evidently been recognized in the States, and it must eventually be recognized here. In the meantime, as was the case in England, no doubt the pace will be made by individual and corporate effort. Although Canadian miners will heartily welcome any information that can be given them by their confreres in the United States, we think they will have to work out their own salvation, and we further think they are doing it remarkably well. One of the gentlemen who is soon coming to visit us with the English delegates from the Institution of Mining Engineers has recently been telling his colleagues through the columns of the "Colliery Guardian" that Canadian miners were being taught to "hustle" by their rivals in the States. We venture to assert that the average Canadian miner needs no lessons in "hustling," as this gentleman will find when he reaches Glace Bay.

Judge Russell, of the Supreme Court of Nova Scotia, has recently given a judgment which is of more than ordinary interest to the owners of coal areas in the Province. The suit in question was a very bare-faced attempt to deprive the Dominion Coal Company of their ancient title to the Point Aconi submarine coal leases near Sydney Harbour. The general manager of the coal company, in a communication to the "Montreal Star," stated that suit was inspired by the Dominion Iron and Steel Company, and was regarded by the coal company as "an unblushing act of piracy on the part of the steel company." The original leases were granted by the Mines Office in 1866, and have been renewed at intervals of twenty years since. The claim of Mr. Burchell, who acted for the steel company in this matter, was based upon alleged inaccuracies in the official plan and upon technicalities so trifling as to be practically unexplainable. The main leases of the Dominion Coal Company were secured to them by Act of Parliament at the time of incorporation for a period of ninety-nine years, but outside this blanket lease all other Nova Scotian coal leases are based upon the plans of the Mines Office, which the steel company endeavored to prove incorrect. Had the contentions of the coal company's opponents been upheld it would have put all other coal owners in a position of embarrassment and incertitude as to the validity of their titles. From olden times men have invariably respected ancient landmarks, and have regarded the remover of such as the common enemy. Although the judgment given in this case will give claim jumpers pause, yet it is very disconcerting to find that original grants from the Crown of such ancient standing can be so easily and wantonly attacked.

One of the Montreal newspapers in referring to the Elk River fire, which it was said at one time might involve the coal mines of the Crow's Nest, quoted some one in the Geological Department at Ottawa as having said that the outcroppings of the coal seams along the Cape Breton shore had been deliberately set on fire by the French before they evacuated the country at the time of the British occupation. This is certainly a very long time ago, yet we should be glad to learn where the geological gentleman in question obtained his information. No one in Cape Breton seems to have heard this version before, and it is not referred to in that vade mecum of early days of coal mining here, Mr. Richard Brown's history. It is very generally understood these outcrop fires were started by coal smugglers in the days when it was an offence to mine coal in Cape Breton. In this year of the Tercentenary, and the culmination of the entente cordiale in the Franco-British Exhibition, it is only right to call in question such an aspersion on the memory of the gallant gentlemen who sleep at Louisburg, and who fought their last for the fair lilies of France.

ONTARIO.

Cobalt.

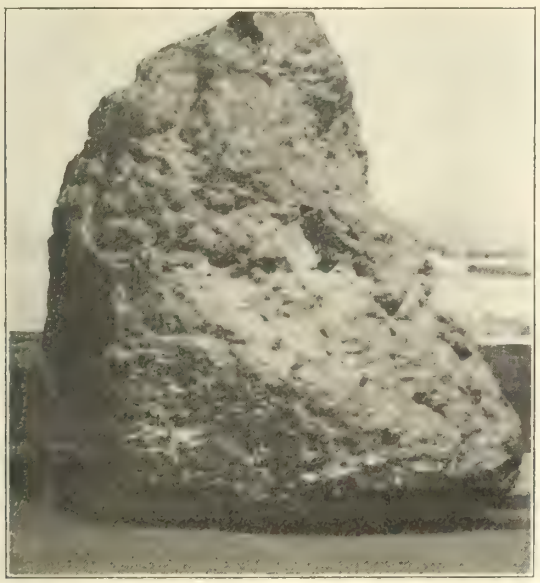
Crown Reserve. Returns from a car of 23 tons, consisting of 100 bags of screenings and 150 bags of No. 1 ore, the shipment averaged 5,300 ounces of silver or nearly $3,100 for the car. Approximately 85 per cent. of the values were in the 150 bags of high grade ore.

Trinity Cobalt.—The new plant on the Trinity Cobalt is in operation. The shaft, which is being sunk to 100 feet is now down 35 feet.

Viceroy Cobalt.—Work will be started at once on the property of this company, located in Lot 8, Concession 4, Coleman. The control of this company has passed to a syndicate of Ohio oil men.

Red Rock.—On Friday, July 24th, work was stopped here. Supt. W. R. Thompson has left the camp. It is understood that the suspension of work was due to lack of funds.

Nipissing.—The surface prospecting which has been carried on by this company on their property within the limits of the town of Cobalt, has given the town the appearance of a mining town in the fullest sense of the word. Twenty-five men have been employed trenching across vacant lots, between houses and along the streets for two weeks. In one case a trench was dug for several hundred feet with no result. Argentite street was reached, the street was skipped to be prospected at some later date and the trench continued for some distance. During the noon hour the foreman of the trenching gang, while



NUGGET FROM GROVER ADLEN SMITH.
Property in S. Lorrain. Weight 117½ lbs.

waiting for his men, noticed some cobalt bloom on an outcrop by the roadside and with his pick uncovered an 8 to 10 vein of smaltite and silver, which assayed 10,000 ounces. This vein is numbered 100 on the map of the Nipissing. A few days later vein 101, a narrow but very rich vein of calcite and silver was found in a cross trench 200 feet distant. Four shafts are being sunk within the town limits, one of which, known as the Promise shaft, is expected to locate the extension of the La Rose Right of Way vein.

The quarterly statement of the Nipissing Mining Company compares with the last statement as follows:

	July 1, '08	April 1, '08
Cash in bank and bullion on hand.	$705,400	$614,974
Ore in transit and at smelters....	169,096	158,491
Ore sacked.	112,235	200,030
	$986,731	$972,495

Approximately 13,000 shareholders received checks for the quarterly dividend.

Progress.—Operations will be resumed at once on the Progress property, situated south of the Temiskaming. A new boiler and hoist will replace the ones destroyed in the recent fire and a new three-drill compressor will be installed.

There are now eleven mines on the list of regular dividend payers, the Buffalo City, City of Cobalt, Coniagas, Crown Reserve, Kerr Lake, McKinley-Darragh, Nipissing, Right of Way, Silver Queen, Temiskaming and T. & H. B. The Trethewey and the La Rose Consolidated will undoubtedly be added to the list in the near future.

In the first six months of 1908 these mines paid a total of $1,504,591, making the total dividends paid by Cobalt companies to July 31, 1908, $5,551,701. This does not include the O'Brien, Drummond and La Rose mines which are close corporations. These properties have paid approximately $2,500,000 in profits to their owners.

Maple Mount District.

Montreal River.—Supt. R. W. Foster, of the Canadian Ores, Limited, states that he has sacked 130 bags of high grade ore from the 30-foot shaft on the main vein. The work this summer has been principally confined to prospecting. Twenty-four veins have been located, five of which have been trenched. A new cobalt vein six inches wide, was found last week. Mr. Foster expects to sink the No. 1 shaft 200 feet and develop all of the veins from this shaft. He is at present operating one drill, a small boiler and hoist. A seven drill compressor, new boiler and 10 x 12 hoist have been purchased and will be installed this winter. Silver has recently been found on both the Enright and Gillies properties in this section.

Miller Lake.—The reports of important discoveries in the vicinity of Miller Lake, a small body of water lying five miles southwest of Bloom Lake, have been confirmed. There is every indication that this area will prove to be richer than the Silver Lake section. The most valuable discovery so far made is on the Gates claims, orginally staked last May by Cartwright and Le Heup. The vein, which is three to four inches wide, is smaltite and silver and has been traced 240 feet. Several good discoveries have also been made on the Bonsall claims.

BRITISH COLUMBIA.

Rossland.

The three leading mines of this camp, the Centre Star group, the Le Roi and the Le Roi 2, Limited, are making an exceptionally good showing when it is considered that the market price of silver and copper is at such a low figure. While the gold is the chief value found in Rossland ore, the fluctations in the price of copper and silver affects the profits of the mines to quite an extent. It is said that the Centre Star group is earning a net profit of $35,000 to $38,000 per month; the Le Roi falls considerably under this but are yet putting money aside each month and, to be brief, the Le Roi 2, Limited, continues to pay a two shilling dividend every few months.

The lessees of the Blue Bird and those who have been operating the Evening Star have made a nice sum of money of their enterprise, but the men who have had several of the other small properties hereabouts under lease have earned very little over expenses. Nothing undaunted, however, a number of the miners are looking about for new showings to delve in, their bosoms full of the hope that possesses nearly every prospector.

At the Centre Star they are shipping second class ore from the dump. This ore was placed on the dump seven or eight years ago when the smelting charges prohibited its shipment to a reduction works, but it is thought that a margin of profit can be made on it under present treatment and freight rates.

The ore shipments from the local mines are averaging from 5,200 to 5,800 tons per week from the large mines with an occasional car of hand picked ore from the small mines. The lessees of the Evening Star are shipping about a car per week and have installed a small steam plant to facilitate the work of getting out ore. The lessees of the Homestake and Sunset have each shipped a car of good ore in the last week.

Boundary.

The shipments from the Boundary's leading shipper, the Granby, have not been as heavy during the last two weeks as they could have been, as they have had several furnaces cold at the smelter connecting them up to the newly installed blowing engines. During the week ended August 15th, for instance, they only shipped 16,039 tons. This, however, was partly owing to the wave of uncertainty that passed over the Boundary district with the news that a devastating forest fire had disabled the coke making apparatus of the Fernie mines. It was feared for a time that the local supply of coke would be used up and the Fernie supply unavailable for many weeks to come, but at this writing no serious delay is apprehended.

The B. C. Copper Company have been shipping from 14,000 to 14,500 tons of ore per week and expected to augment these soon, but they will no doubt delay the increasing of their output until the coke situation is more settled.

The Dominion Copper Company has been shipping over 3,000 tons of ore per week, but as this company did not have a very large store of coke on hand they closed down both mines and smelter in consequence of the Fernie fire. They have now arranged to get a supply of coke from the Pacific Coast if the Fernie mines cannot supply them and will resume work in a few days. The machine shop of the Dominion Copper Company, situated at Boundary Falls, was burned last week. This will cause the company considerable inconvenience. The shop was an up-to-date one. Up to Wednesday, August 12th, for that week the Dominion Copper Company treated 2,204 tons of ore from their Brooklyn, Rawhide, Sunset and Mountain Rose mines.

The Boundary mines are beginning to realize the result of their efforts to keep the cost of ore and copper production down to as low a point as possible. The Granby Company is making copper for a fraction over eight cents per pound, and the B. C. Copper Company have got their costs down so that they can land copper in New York for about 9¾ per pound, and they intend to lower this figure when they increase their output.

Work on a number of the smaller properties is progressing favorably. Good results are being obtained on the Diamond-Texas, E. P. U., Tip Top and other growing properties around here and operations will shortly be resumed on the Skylark, Prince Henry and two or three other prospects. A tunnel is being driven on the Golden Eagle. It is expected that sufficient ore will be taken out during the course of the work to pay expenses.

The Humming Bird has been bonded to New York capitalists. An average shipment of 468 tons of ore from this property recently returned $26.66 per ton.

W. Y. Williams, consulting engineer for the Granby Company, has just returned from a trip to the Similkameen district, where, among other things, he looked over the work now being done on the copper property at Bear Creek. A large body of good ore has been blocked out at this mine and shipments will be made as soon as the railway, now rapidly approaching that point, is in a position to handle ore.

The party of the Geological Survey of Canada are reported as making good progress with the survey at that point. This is valuable work from the standpoint of the mining men and the Government will be amply repaid for the work by the mining industry in years yet to come.

A force of twelve men is working at the Golden Zone, near Hedley, and the 10-stamp mill, with 5-stamp equipment at present, is working satisfactorily. Ore is being taken from a glory hole and dropped into the bins connected with the mill which are close to the work.

The fortunes of McKinley Camp fluctuates probably more than any section in this country. One day we hear of a strike of rich ore and the bonding of a group of claims by outside capitalists and later on the bond has been thrown up and things look dull again. This is largely due to lack of railway facilities and there is little doubt but that when the railway now being built reaches that camp it will make a name for itself. Assays from a 3-foot paystreak on the Victor at McKinley give $80 in gold per ton, while samples taken from the C. P. R. claim have shown as high as 18 ounces gold to the ton.

Nelson.

The Kootenay Development Company has leased the Silver King mine and will operate the mining machinery hereafter with electric power.

The Van-Roi Mining Company of London will hereafter control the destinies of the Vancouver group, which the Le Roi 2, Limited, have been developing. The capital of the new company is £34,500.

The shipments of ore from this section averages 1,650 tons per week at present. This ore is mostly high-grade silver-lead or high grade gold bearing ore.

In the Reco, at Sandon, they have cut a two-foot ledge of good galena ore. Sixty men are now employed in the four stopes being worked at the Silver Cup. A strike has been made on the Nugget, Sheep Creek district, where a narrow shoot has been encountered giving high values in gold.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney, August 13.—About ten days after commencing to sink a bore hole on the north shore of Cow Bay, near the old Blockhouse shipping pier, the North Atlantic Collieries Company has struck the Blockhouse seam at a depth of 120 feet. The seam is reported to be nine feet nine inches thick. The coal is clean and rich and will make a first-class metallurgical coke. The Dominion Coal Company owns part of the territory in which the seam lies.

Halifax.—The cornerstone of the new Nova Scotia Technical College was laid by Lieutenant-Governor Fraser on August 20. Prof. F. H. Sexton, Director of Technical Education, presided, and a number of distinguished citizens spoke.

ONTARIO.

Cobalt.—The management of the Silver Leaf mine has commenced diamond drilling on the north side of the property

Cobalt.—The Temiskaming and Northern Ontario Railway Commission is advertising for tenders for certain mining leases of parcels of mining lands in and near the townsite of Cobalt. Tenders must be received before twelve o'clock noon on September 16th. The leases are for a term of 999 years. The first parcel comprises 13 acres around Cobalt Station; the second contains 4.04 acres of the townsite in the westerly portion of Lot 44; the third embraces Lots 338, 388 and 389 of the townsite, including the mining rights under one-half the streets adjoining said lots. A rental of $1 per annum plus 25 per cent. of the gross value at the mouth of the mine of all ores mined will be reserved for Commission.

Parry Sound.—The discovery of a rich vein of bornite at the McGowan mine, about two miles east of this town, has led to a renewal of agitation for a local smelter. The Canadian Mining Journal will soon publish particulars of the discovery.

BRITISH COLUMBIA.

Fernie, August 12.—A wave of cool weather, followed by a fall of rain has improved conditions here to a remarkable extent. Refugees are returning by carloads from Cranbrook and adjoining towns. It is now possible to purchase meals, and the distribution of free food will be gradually reduced. Phenomenal progress is being made in building. Already several respectable business streets have sprung from the ashes of the obliterated town. The people of Cranbrook have earned the warmest gratitude of Fernie citizens. Their generosity has been boundless.

The Relief Committee has now $80,000 in hand. Provisions and supplies arrive by every train. Premier McBride is expected here in a few days.

Phoenix.—During the first seven months of 1908 the ore shipments of the Granby Consolidated amounted to 619,316 tons, nearly double the tonnage recorded for a similar period in 1907. The monthly returns for 1908 have been as follows:

	Tons.
January. . .	74,203
February. . .	80,155
March. . .	110,2223
April. . .	87,202
May. . .	93,316
June. . .	85,257
July. . .	88,960
Total. . .	619,316

For the same period in 1907 they stood thus:

	Tons.
January. . .	34,192
February. . .	32,465
March. . .	63,826
April. . .	70,158
May. . .	5,072
June. . .	72,820
July. . .	80,216
Total. . .	358,749

Greenwood, August 17.—What might have been a most disastrous fire occurred in the machine shop of the Dominion Copper Company's smelter at Boundary Falls. As it was, the fire entirely destroyed the machine shop and blacksmith shop, entailing a loss estimated by Manager Roosa at from $25,000 to $30,000. Only the hearty, well directed work of the men employed at the smelter and the company's excellent water supply saved the smelter and offices from going.

The building destroyed was a frame structure about 100 x 30 feet and was situated between the trestle and a temporary machine shop and quite near the blower room. The shop was equipped with a lathe 25 inches by 20 feet, a smaller lathe 16 inches by 10 feet, a Cincinnati radial drill, a threading machine, a planer, a shaper, and electric motor and a full equipment of tools and was considered to be, it is said, the best in the Boundary. The building was insured in one of the Ceperly-Rounsfell & Co. companies, but Mr. Roosa did not care to make any statement of the insurance, beyond that all their plant was sufficiently insured.

Nelson.—During the past two weeks of August in the district of which Nelson is the centre, there were 39 mining locations recorded. Eighteen of these were situated in the Sheep Creek and Salmon River districts, and 11 on the other side of the divide near or in the Bayonne country.

Vancouver.—The Guggenheim syndicate secured, on August 12th, an interim injunction against H. B. Hobson working the Cariboo mines. Hobson has a $20,000 clean-up in sight.

Ladysmith.—A new coal mine is being opened by the Wellington Colliery Company, about three miles below Extension near the McLean ranch. The seam lies almost flat and is seven feet wide.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Coal has been discovered in Devon in the course of quarrying operations near Holsworking. It is not of good quality, but boring will be undertaken to ascertain whether it improves with depth.

The Scottish Coal Trades Conciliation Board have agreed upon a reduction of miners' wages by 12½ per cent.

In the Fife, Scotland, mining area, various extensions are in progress which will give employment to a large number of men.

About 70 coal miners were killed by an explosion which occurred in the Maypole coal mine at Wigan, England, on the 20th inst.

RUSSIA.

Gold discoveries continue to be made in the further East. A rich gold sand area has been discovered on the Tchukot peninsula on the shore of the Sviataya Chresta. The metal has been found at two points 250 versts apart, and the geological formation indicates that it is likely to be found at other places.

The gold and platinum mines on the rivers Tura, Issa, Aklaya and Barautchi in the Ural district, have been flooded and all work stopped. This industry has sustained a heavy loss.

GERMANY.

The existence of extensive lignite deposits near Merseburg has been ascertained by boring and a thick seam has been found in the bed of the River Elster.

The Gewerkschaft Konig Ludwig will construct 60 coke ovens with by-product recovery plant at Recklinghausen.

Thirteen men were killed and eight badly injured as the result of a firedamp explosion in the Dutweiller mine near Saarbrucken on August 11th.

ITALY.

The Sicilian sulphur industry is suffering from over-production. At two of the ports, Empedode and Licata, there is no room for new warehouses and the stocks held are enormous.

CONGO.

Two shipments of gold of the value of $300,000 have passed through Uganda from King Leopold's Kilo mines in the Congo State. It is estimated that over 100 miles in Ituri province will yield gold ore, both allurial and quartz. Foreigners are rigorously excluded.

UNITED STATES.

Eighty per cent. of the coal mines along the Monongahela river are idle and thousands of men out of work, owing to low water in the Ohio river, which prevents shipments being made.

The Amalgamated Copper Company of Butte, Montana, produced in July 20,000,000 pounds of copper from the Washoe smelter, making a new record, at the lowest cost of production per pound in the history of the plant. The cost is gradually being lowered by the introduction of new economies and the treatment of larger amounts of ore.

Work has been resumed on the properties of the Ohio Copper Company at Bingham, Utah. The concentrating mill will be equipped to treat 2,000 tons of ore per day, and when completed will represent an investment of $1,250,000.

AUSTRALIA.

Labor conditions in the coal mining industry of New South Wales and numerous strikes are reported.

The State of New South Wales offers a reward of £500 to the person or company who shall first produce 50,000 pounds of quicksilver from cinnibar ores raised in the State.

Operations in several of the Wolfram mines in the Emmaville district, N.S.W., have been suspended for six months owing to the low price of the product.

SOUTH AFRICA.

The total output of gold in the Transvaal for the first six months of 1908 amounted in value to £14,442,000, of which £13,875,000 was produced by the mines of the Witwatersrand.

MEXICO.

Mr. William C. Seddon and other capitalists of Baltimore have obtained control of 1,500,000 acres of mining property tapped by the Cananea, Yaqui River and Pacific Railroad, and also of the Douglas Copper Company at Fundicion, Sonora, embracing a copper and gold smelting plant.

On July 27th two more furnaces were blown in by the Cananea Cons. Copper Company at Cananea, making a total of four in operation or half the capacity of the smelter. When the whole plant is running the output is expected to average 1,000,000 pounds per month for each furnace.

STATISTICS AND RETURNS.

Shipments from the collieries of the Cumberland Railway and Coal Company, Springhill, N.S., for the month of July were 24,590 tons.

DOMINION COAL OUTPUT TO AUGUST 15TH, 1908.

	Tons.
1	22,400
2	29,170
3	11,860
4	18,100
5	19,510
6	10,740
7	8,340
8	10,060
9	15,160
10	7,410
	152,750

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:

	Week end Aug. 15. Ore in lbs.	Since Jan. 1. Ore in lbs.
*Coniagas	63,780	778,260
*Cobalt Central	46,170	293,685
City of Cobalt		
Drummond	185,480	613,900
La Rose	339,170	4,1[illegible],612
McKinley	125,780	2,145,040
Nipissing	174,860	2,65[illegible],550
O'Brien	128,250	4,054,447
Silver Queen	164,680	1,[illegible]43,990
Temiskaming & H. B.	194,500	918,500

*Concentrates.

The total shipments for the week were 1,422,170 pounds, or 711 tons.

The output of the Crow's Nest Coal Company's collieries for the week ending August 14th was 20,819 tons, a daily average of 3,470 tons.

The output of the Crow's Nest Coal Company's collieries for the week ending August 21st was 16,327 tons, a daily average of 2,721 tons; week ending August 23, 1907, 19,199; a daily average of 3,200 tons; week ending August 24, 1906, 17,122 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to date:

	Week end Aug. 22. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo.	.....	759,950
*Coniagas.	.....	778,260
Cobalt Lake.	.....	341,683
Crown Reserve.	54,000	182,000
*Cobalt Central.	.....	293,685
City of Cobalt.	.....	831,240
Drummond.	611,400	675,300
Foster.	.....	238,400
Kerr Lake.	.....	522,974
King Edward.	.....	127,420
La Rose.	244,000	4,344,612
McKinley.	.....	2,145,040
Nipissing.	63,700	2,714,250
Nova Scotia.	.....	311,775
Little Nipissing.	.....	40,110
Nancy Helen.	.....	367,427
O'Brien.	192,180	4,246,627
Peterson Lake.	.....	41,237
Right of Way.	124,080	736,180
Provincial.	.....	143,210
Silver Leaf.	.....	258,000
Sliver Cliff.	.....	52,000
Silver Queen.	80,000	1,123,990
Townsite.	.....	171,700
Temiskaming.	.....	645,680
Temiskaming & H. B.	62,000	980,500
Trethewey.	125,870	790,166
Watts.	60,100	481,090

The total shipments for the week were 1,007,330 pounds, or 533 tons. The total shipments from January 1st to date are 25,832,948 pounds or 12,916 tons.

*Concentrates.

BRITISH COLUMBIA ORE SHIPMENTS.

The shipments for the week ending August 8th have been slightly under the amount shipped weekly recently, although they are in excess of the average for the year. This has been due to the fear of a possible shortage in coke and also to changes still going on at the Granby smelter. However, the trouble is already over and during this week, it is authoritatively stated shipments of coke will have their normal proportions.

It may be noted that the Hewitt mine is now shipping concentrates and the Nugget is getting ready to mill at the earliest available opportunity and for this purpose is building a mill and putting up a short tramway.

The shipments from the various mines and receipts at the smelters for the past week and year to date were:

BOUNDARY SHIPMENTS.

Mine.	Week.	Year.
Granby.	16,000	640,506
Mother Lode.	10,406	89,034
Oro Denoro.	3,970	29,388
Rawhide.	930	9,230
Brooklyn.	550	5,990
Sunset.	621	3,439
Mt. Rose.	60	330
Other mines.	....	621
Total.	32,537	778,548

ROSSLAND SHIPMENTS.

Centre Star.	3,451	101,073
Le Roi.	1,482	46,542
Le Roi No. 2.	449	17,779
Homestake	14	14
Other mines.	....	587
Total.	5,396	166,115

SLOCAN-KOOTENAY SHIPMENTS.

St. Eugene.	509	12,812
Whitewater, milled.	280	8,820
Poorman, milled.	250	7,100
Queen, milled.	185	5,725
Richmond-Eureka.	27	1,140
Arlington, Erie.	24	927
Standard.	22	824
Rambler-Cariboo.	20	770
Vancouver.	22	584
Silver Cup.	61	531
Idaho.	126	219
Hewitt.	21	220
Reco.	22	207
Monarch.	66	129
Grant.	19	28
Other mines.	....	18,379
Total.	1,654	58,461

The total shipments for the week were 39,587 tons and for the year to date 1,003,124 tons.

SMELTER RECEIPTS.

Smelter.		
Grand Forks.	16,000	640,506
Greenwood.	14,376	120,912
Boundary Falls.	2,161	18,889
Trail.	6,465	170,895
Northport (Le Roi).	1,639	50,464

The total smelter receipts for the week were 40,641 tons and for the year to date 1,007,156 tons.

RECEIPTS OF LEAD ORE.

Following are the receipts of lead ore at the smelter of the Consolidated Company, at Trail, for the month of July and the

lead contents of the ore as furnished by G. O. Buchanan, supervisor of the Dominion lead bounty:

Mine.	Net weight lbs.	Lead cont's lbs.
Arlington, Erie.	228,204	5,975
Alpha.	39,939	16,620
Blue Bird, Rossland.	29,106	1,863
Blue Bell.	809,294	489,722
Curlew.	13,479	566
Empress.	2,138	17
Ferguson.	170,015	47,260
Golden Giant.	35,564	24,118
Keystone.	15,283	397
Little Robert.	1,040	172
No. 1.	27,432	823
Rico	81,162	33,982
North Star.	1,408,949	290,298
Ruth.	152,676	50,948
Sally.	38,352	2,148
Slocan Star.	46,586	17,796
Rambler-Cariboo.	122,396	552,980
Richmond Eureka.	347,425	70,179
Sunset.	163,407	110,274
Silver Glance.	9,648	96
St. Eugene.	4,622,696	2,657,835
Standard.	372,769	241,730
Whitewater.	577,963	260,668
Whitewater Deep.	88,507	40,495
Westmount.	86,758	6,770
	9,480,798	4,422,732

The production of the principal copper-producing countries of the world in 1907 was as given in the accompanying table, in metric tons, the figures for 1905 and 1906 being added for comparison:

	1905.	1906.	1907.
Australasia.	34,483	36,830	41,910
Canada.	21,588	19,106	21,022
Chile.	29,632	26,157	27,112
Germany.	22,492	20,665	20,818
Japan.	36,485	40,528	49,718
Mexico.	70,010	62,690	61,127
Peru.	8,763	8,641	10,744
Russia.	8,839	10,658	15,240
Spain-Portugal.	45,527	50,700	50,471
United States.	397,003	416,226	398,763
Others.	397,003	416,226	398,763
Total.	699,514	715,535	723,807

It appears from the above table that the proportion of the total contributed by North America (exclusive of Newfoundland) was 66.44 per cent. in 1907, against 69.60 per cent. in 1906, and 69.85 per cent. in 1905.—Bradstreet's.

COMPANY NOTES.

In a statement of Cobalt dividends printed in our last issue Coniagas Mines, Limited, was not credited with the regular bi-monthly dividend, paid on July 1, 1908, and amounting to $80,000. This omission will scarcely neutralize the pleasure of the stockholders.

The Right of Way Mining Company has declared a dividend of 7 per cent.

MARKET REPORTS.

Coke.

August 21.—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt.
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Metals.

Tin, Straits, 29.35 cents.
Copper, prime Lake, 13.70 cents.
Lake arsenical brands, 13.70 cents.
Electrolytic copper, 13.50 to 13.55 cents.
Sheet copper, 18 cents.
Copper wire, 15.25 cents.
Lead, 4.575 cents.
Spelter, 4.70 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.20 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 per ounce.
Bismuth, $1.75 per pound.
Quicksilver, $42.50 per 75-pound flask.

SILVER PRICES.

	New York, cents,	London, cents.
Aug. 12	51¾	23⅞
Aug. 13	52	24 1-16
Aug. 14	54¼	23 11-16
Aug. 15	51⅛	23⅝
Aug. 17	51¼	23 11-16
Aug. 18	51¼	23 11-16
Aug. 19	51⅛	23⅝
Aug. 20	51⅛	23⅝
Aug. 21	51½	23 13-16

Since 1900 bar silver has fluctuated as follows:

	High.	Low.
1908	58¾	51⅛
1907	70⅛	53⅞
1906	71¾	62⅝
1905	65⅝	55
1904	62	53⅜
1903	61¾	47
1902	56½	47
1901	64	54¼
1900	65⅛	58⅞

COPPER DISTRIBUTION

Though copper is of world-wide distribution and the United States alone has over 3,000 copper mining companies, W. H. Weed, the American geologist, points out that the world's supply is practically derived from less than 250 mines. This includes only localities supplying 100,000 pounds or more annually. Of such mines the United States contains 58; Japan, 38; Chile, 31, and Australia, 28; but three of these countries produce only 30,000 tons each. Mexico ranks next to the United States in production, while Spain ranks third. Five great mines yield three-fifths of the total production, and one mine alone contributes one-fifth.

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Temiskaming and Northern Ontario Railway Commission

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Sealed tenders addressed to the undersigned and endorsed "Tender for Mining Lease," will be received at the office of the commission, 25 Toronto Street, Toronto, up to 12 o'clock noon on Wednesday, the 16th day of September, 1908, for mining leases for 999 years of the following parcels:

PARCEL 1.—The Cobalt station grounds, comprising 13 acres, more or less, the right of way adjoining the station grounds to the south, containing 1.15 acres, more or less, and the right of way to the north of the station grounds, and comprising 2.68 acres, more or less, all as shown on plan which may be inspected at the office of the Commission, Toronto, and the office of the Mining Engineer, Cobalt.

PARCEL 2.—The westerly portion of lot 44, in the Townsite of Cobalt, containing 4.04 acres, more or less, as shown by another plan which may be inspected at the office of the Commission, Toronto, and the office of the Mining Engineer, Cobalt.

PARCEL 3.—Lots 338, 388 and 389, in the Townsite of Cobalt, including the mining rights under one half the streets adjoining said lots.

An accepted cheque upon a chartered bank of Canada, payable to the order of the Chairman and Secretary-Treasurer of the Commission, for the amount of the cash bonus tendered for such lease, must accompany each tender.

Forms of tender and of proposed leases (reserving a rental of $1 per annum, plus 25 per cent of the gross value at the mouth of the mine of all ores mined), and full information and plans showing location of each parcel may be examined at the office of the Commission in Toronto, and the office of the Mining Engineer, Cobalt.

All tenders must be made on the form supplied by the Commission for the purpose and signed with the actual signatures of the parties tendering.

In case of each parcel, the party whose tender is accepted will be required to promptly execute a lease in form satisfactory to the Commission, failing which his deposit will be absolutely forfeited to the Commission.

The cheques sent in by unsuccessful tenderers will be returned to them.

The Commission does not bind itself to accept the highest or any tender.

A. J. McGEE, Secretary-Treasurer.

Toronto, Aug. 6, 1908.

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Iron inlarge bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and in other forms; zincblende, galena, pyrite, mica, graphite, corundum, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. The allied metal, cobalt, is also found in Ontario in unsurpassed quantities.

The output of iron, copper, nickel, silver and cobalt in 1906 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HON. FRANK COCHRANE,
Minister of Lands, Forests and Mines,
Toronto, Canada.

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The attention of Miners and Capitalists in the United States and Europe is invited to the

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All mines belong to the Government of the Province on all unsold lands and on all those sold since the 24th July, 1880, but gold and silver are always reserved whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The Government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such license the first right to purchase the mines. In the case of lands where the surface only is sold, the owner of the surface may be expropriated if he refuses an amicable settlement

The price of prospecting licenses is $5.00 per hundred acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only $2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

On lands situate more than 20 miles from a railway in operation, $10.00 per acre, and on lands situate less than 20 miles from such a railway, $20.00 per acre :

Superficial products and building materials are sold $2 and $4 an acre according to the distance from rail road.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions : The full price must be paid in cash ; specimens must be produced and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years and $500.00 spent for each 100 acre concession.

MINING LICENSES, giving the right to work the mine and dispose of its products, are granted on payment of a fee of $10.00 and a rent of $1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres or one and the same person, and must be marked out on the ground by posts

The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made, and through which the new Transcontinental Railway will run.

The government has made special arrangements with MR. MILTON L. HERSEY, 171 St. James St Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines, at Quebec, will give all the information asked for in connection with the mines of the province, and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to :

The Hon. Minister of Colonization, Mines and Fisheries
Parliament Buildings, Quebec.

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Commissioner Public Works and Mines, - - HALIFAX, NOVA SCOTIA

JUDICIAL SALE

of all Assets of the Copper Mining and Smelting Company of Ontario, Limited in Liquidation.

Sealed tenders will be received, addressed to His Honor F. W. Johnson, Local Master, Sault Ste. Marie, Ontario, and marked "Tenders in THE COPPER MINING AND SMELTING COMPANY of Ontario, Limited, Liquidation," up to twelve o'clock noon on the Fifteenth day of September, 1908, for the purchase of all the assets of the said Company now in the possession and control of the Liquidators, which assets consist of the valuable Mine and Mining Property situated in the Town of Bruce Mines in the District of Algoma and Province of Ontario, on the North shore of Lake Huron (where there is a good harbour and shipping facilities) with machinery, buildings, plant and full equipment situated on the premises, and wharfage, railway tracks and sidings.

Tenders will be received for the entire property or for any of the following parcels :

PARCEL 1

Mine, Mining Rights, Buildings, Machinery, Plant, Concentrating Mill, Railway Track and Sidings, Coal Dock, Skimpings, Slimes and Ore already won. There are two principal working shafts some 500 feet in depth, which have been in full operation until recently. The property consists of all the mineral rights in two grants or locations, embracing an area of some 20 square miles (with the exception of 116 acres already disposed of), also the surface rights of about 665 acres of said lands (of which 300 acres are within the limits of the Town of Bruce Mines).

Bruce Mines Station of the Canadian Pacific Railway, situated on the property, is 135 miles from Sudbury and 37 miles from Sault Ste. Marie. The Bruce Mines and Algoma Railway here crosses and runs down to the Lake, having a station and sidings convenient to the mines.

THE BUILDINGS, adapted to large operations, are in good condition, and consist of machine shop, fully equipped, blacksmith's shop, store houses, oil house and boiler houses, two power houses, mill offices, Manager's and Mill Superintendent's houses, boarding house, ice house, stable and dynamite magazine.

THE MACHINERY AND PLANT, which are in good running order, have an inventory valuation of $96,500.00. The concentrating mill, situated on the Lake front, has a capacity of 250 tons per day and pumping plant of 60,000 gallons per hour. Its construction and equipment cost $130,000.00. The Electric Light plant has a capacity of 500 lights. One and one half miles of Railway Track (with sidings) connect the mine proper with the Concentrating Mill and Coal Dock, where vessels drawing 16 feet can load and unload.

THE SKIMPINGS, estimated at 120,000 tons, are useful for fluxing purposes in nickel smelters, and for the manufacture of artificial stone. A separate tender for these skimpings will be considered. The ore already won and in the stopes is estimated at 9,000 tons. Considerable development work has also been done on the property exposing a large body of ore.

PARCEL 2

TOWN AND PARK LOTS, containing about 300 acres within the town limits, sub-divided into over 100 convenient building lots.

WATER LOTS, situated in front of the Concentrating Mill and adjoining the coal dock.

ISLANDS : "French," "McCoys," "Bruce," "Rat," "Mouse," having in all an estimated area of 75 acres, with some suitable lumber-mill sites.

PARCEL 3

RANGE LOTS, consisting of about 365 acres in the Township of Plummer Additional.

PARCEL 4

WHARF AND WAREHOUSES, conveniently situated adjoining the Government Dock, with 16 feet depth of water.

Tenders for separate lots and islands mentioned in parcels 2 and 3 will be considered.

The principal workings are being kept free of water and will be open for examination by intending purchasers. Full descriptions and particulars of the real estate and full details, inventories, etc., of the plant, machinery and other assets of the Company can be obtained upon application to the Liquidators—T. Hayes Sheen, Jnr., at Bruce Mines, Ont., or R. C. Jennings, 18 Toronto Street, Toronto. A full inspection of all the property may be had at any time.

As to the real estate, it is understood that the foregoing description is only a general description and the areas given are only approximate and the purchaser is to satisfy himself as to the quantity of land and the title of the Company thereto and shall search the title at his own expense and the liquidators will not be required to furnish any abstract of title or to produce any title deeds other than those in their possession.

TERMS OF SALE: 10 per cent. cash; 40 per cent. within 30 days, and balance within 60 days, with interest at 7 per cent., secured to the satisfaction of the Liquidators. The tenders must be accompanied by a marked cheque, payable to the Liquidators for 10 per cent of the amount of tender, which will be returned if tender is not accepted.

The highest or any tender not necessarily accepted.

The other conditions of sale are the standing conditions of sale of the Court as far as applicable

For further particulars and conditions of sale, application may be made to either of the above-named Liquidators or their Solicitors.

DATED at Sault Ste. Marie this Third day of July, A.D., 1908.

F. W. JOHNSON, Local Master.

HEARST, McKAY & DARLING, Sault Ste. Marie, Ont.
Solicitors for Liquidators.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

Mineral Locations are granted to discovers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full Information, together with Mining Reports and Maps, may be obtained by addressing

HON. MINISTER OF MINES

Or WM. FLEET ROBERTSON, Provincial Mineralogist, VICTORIA, B.C.

Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advertisement will not be paid for.

The Canadian Miner's Buying Directory.

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Before purchasing supplies, machinery or equipment, consult the firms mentioned in this Directory. They are prepared to fill your order with all possible despatch. If requiring anything not listed in these columns, address THE CANADIAN MINING JOURNAL and you will be put in touch with responsible firms. In writing advertisers, kindly mention this Journal.

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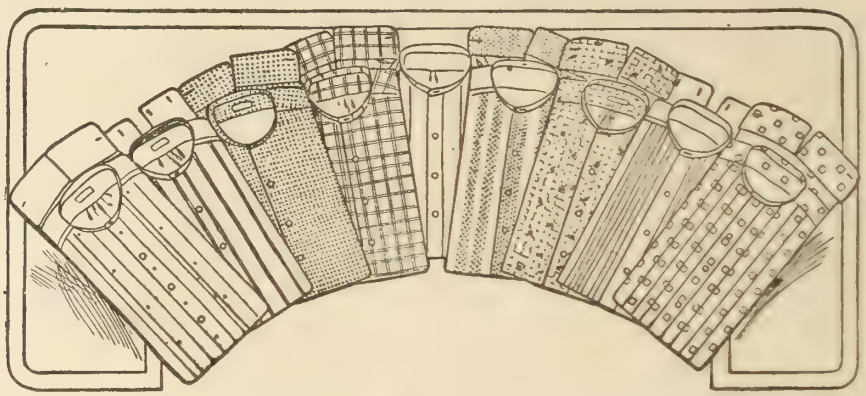
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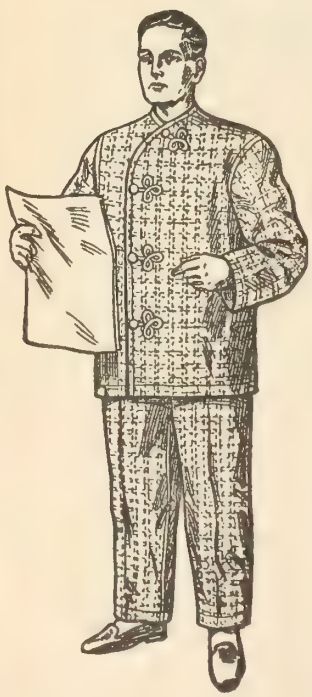
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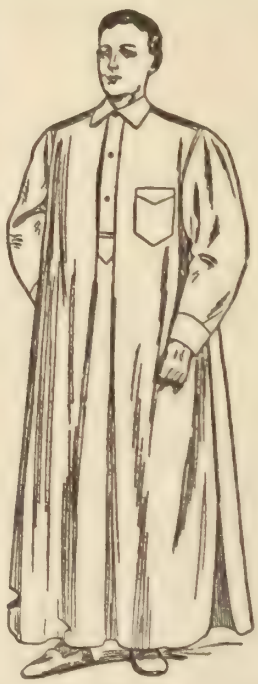
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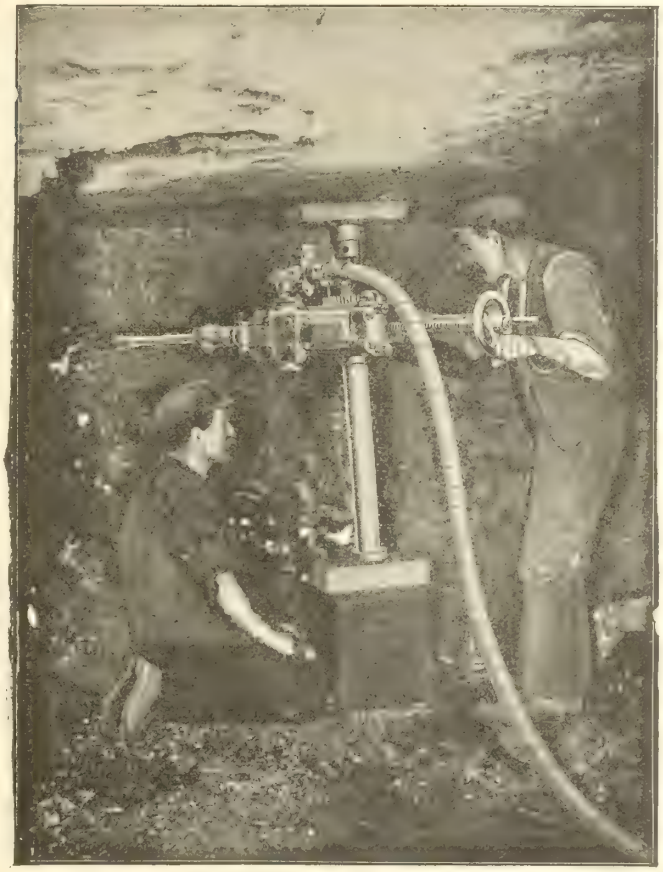
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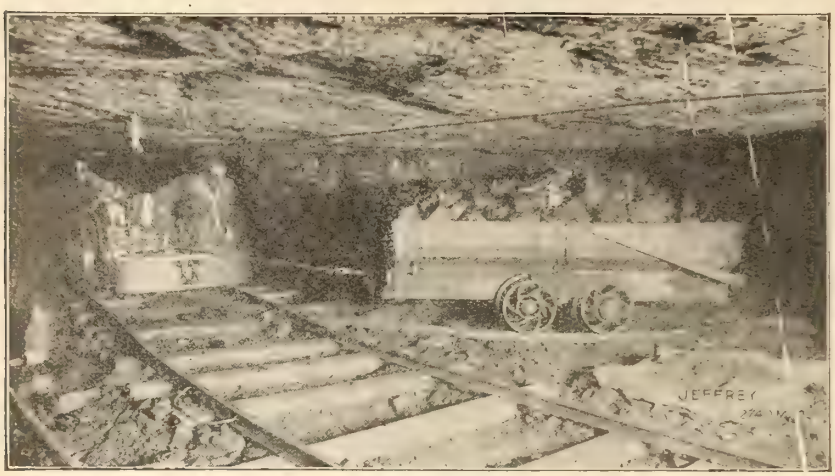
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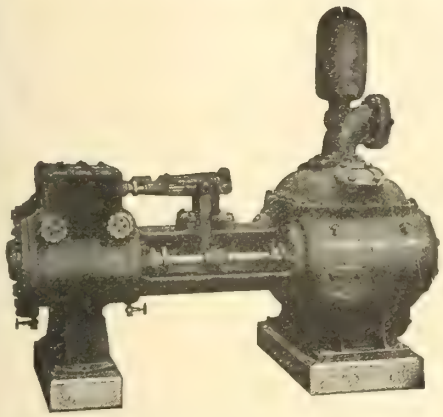
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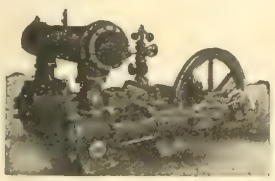
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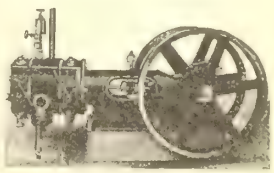
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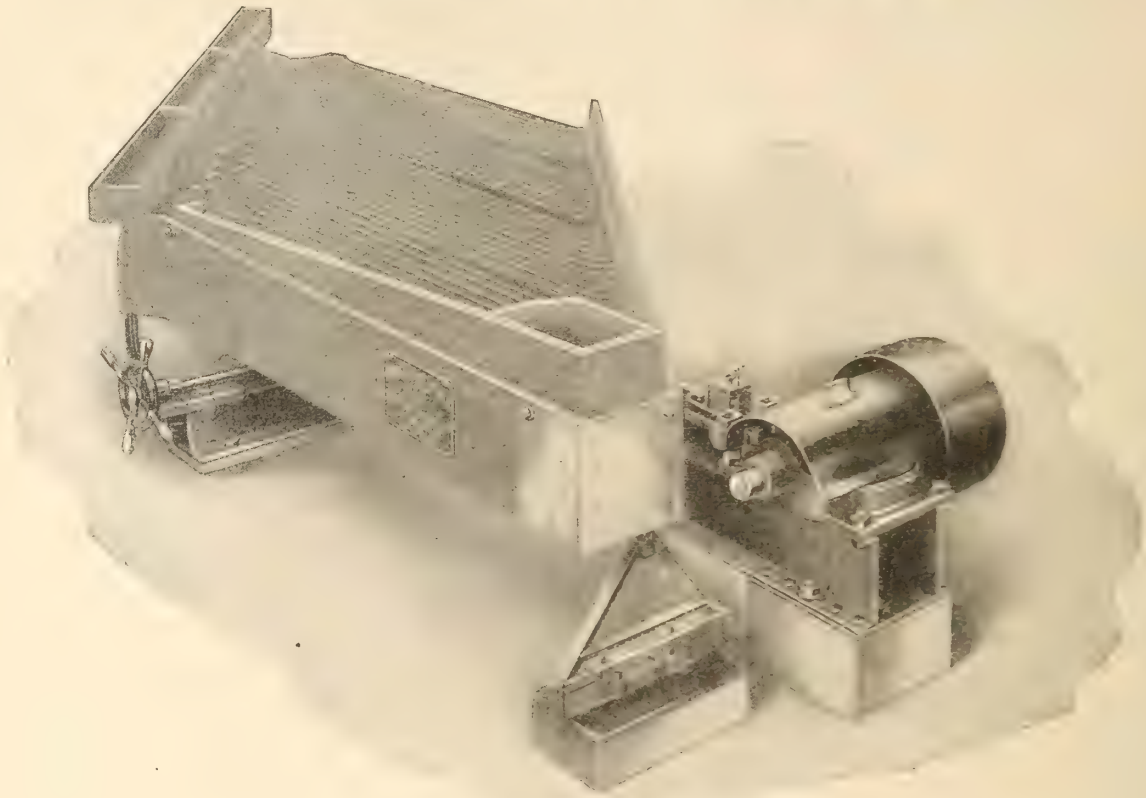
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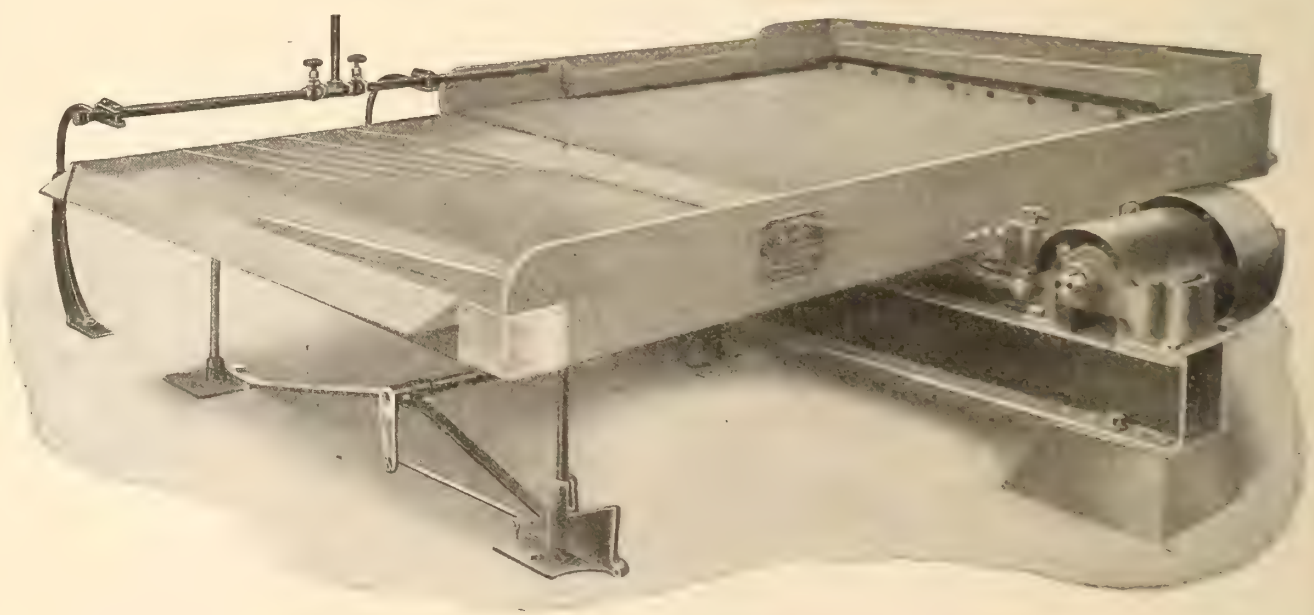
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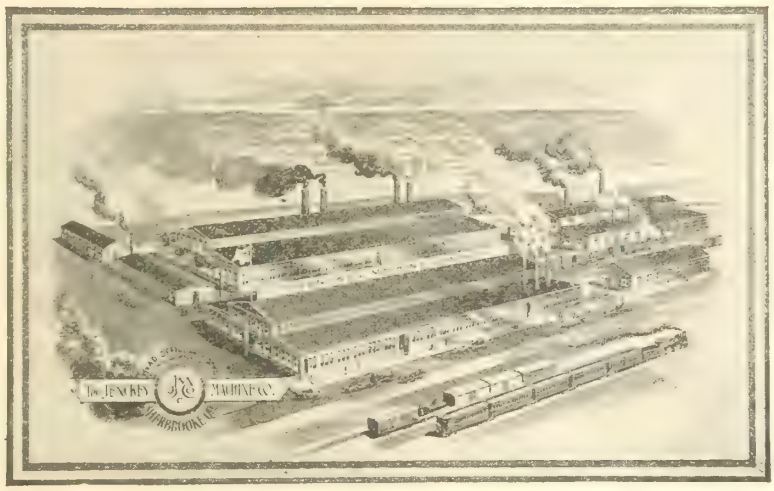
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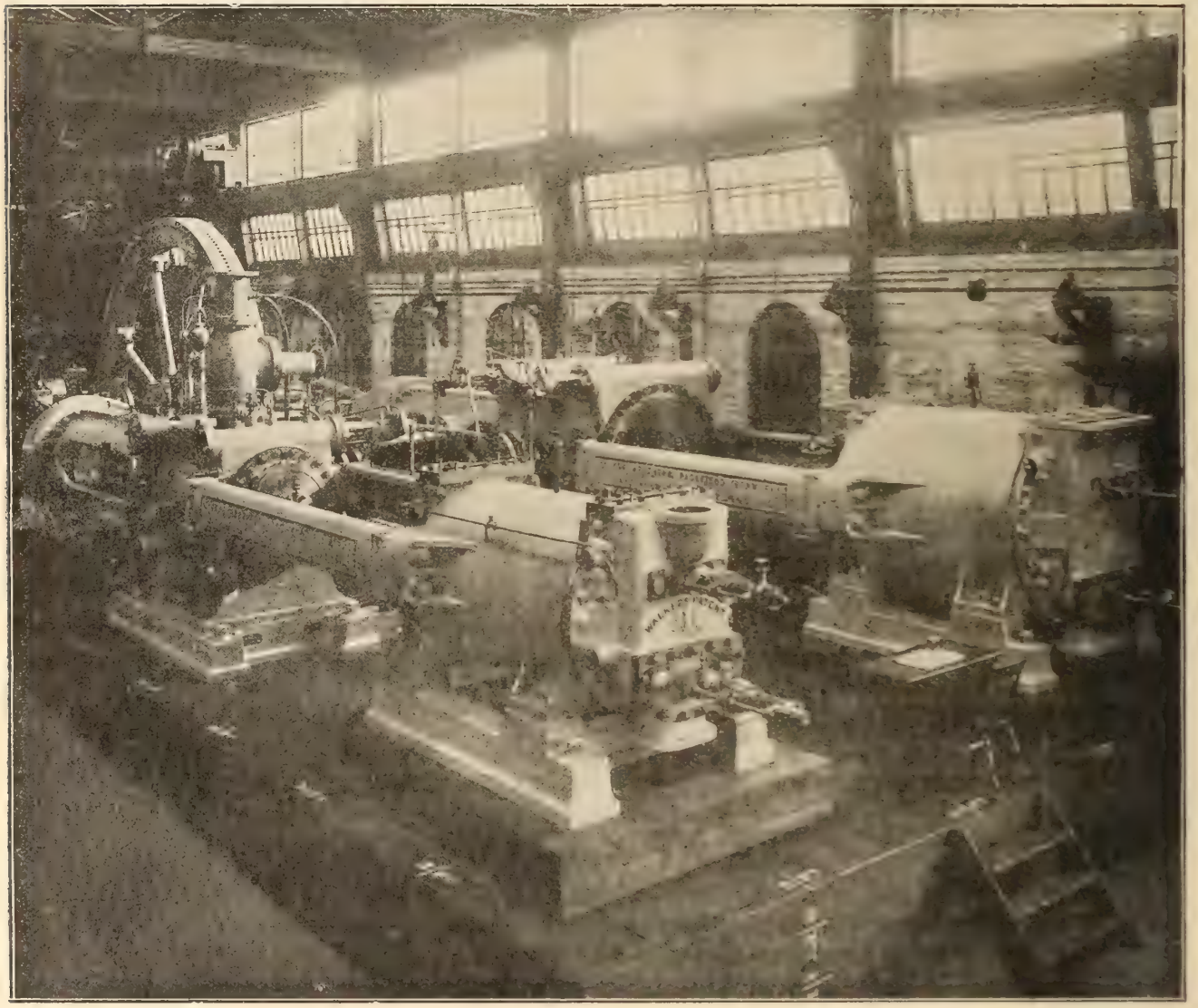
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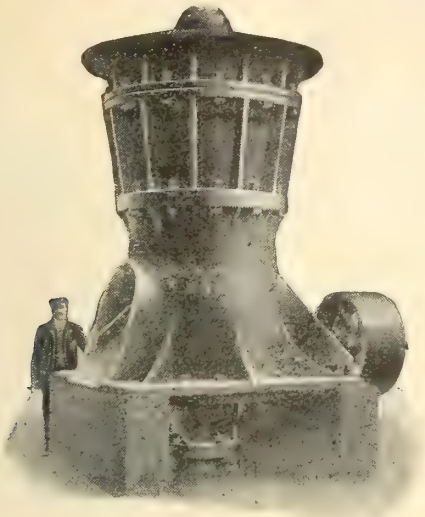
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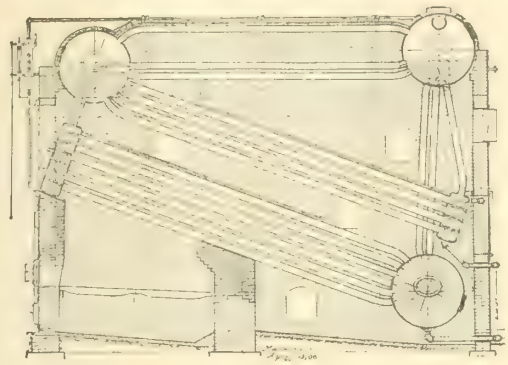
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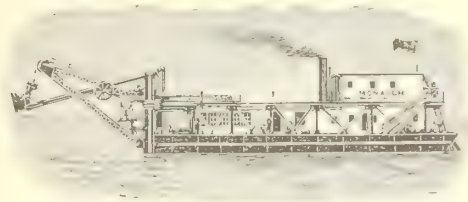
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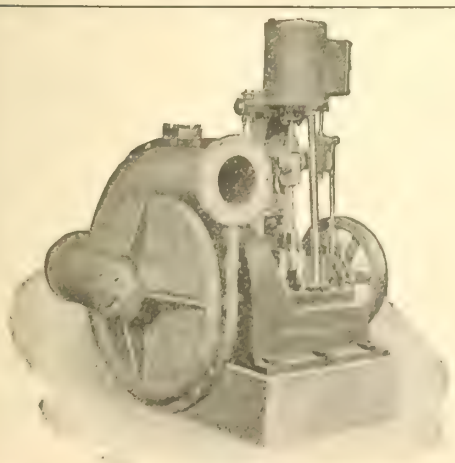
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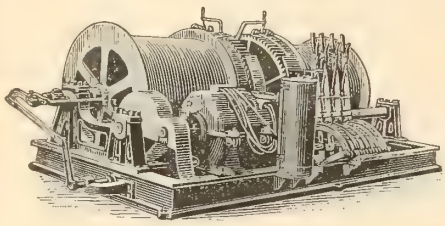
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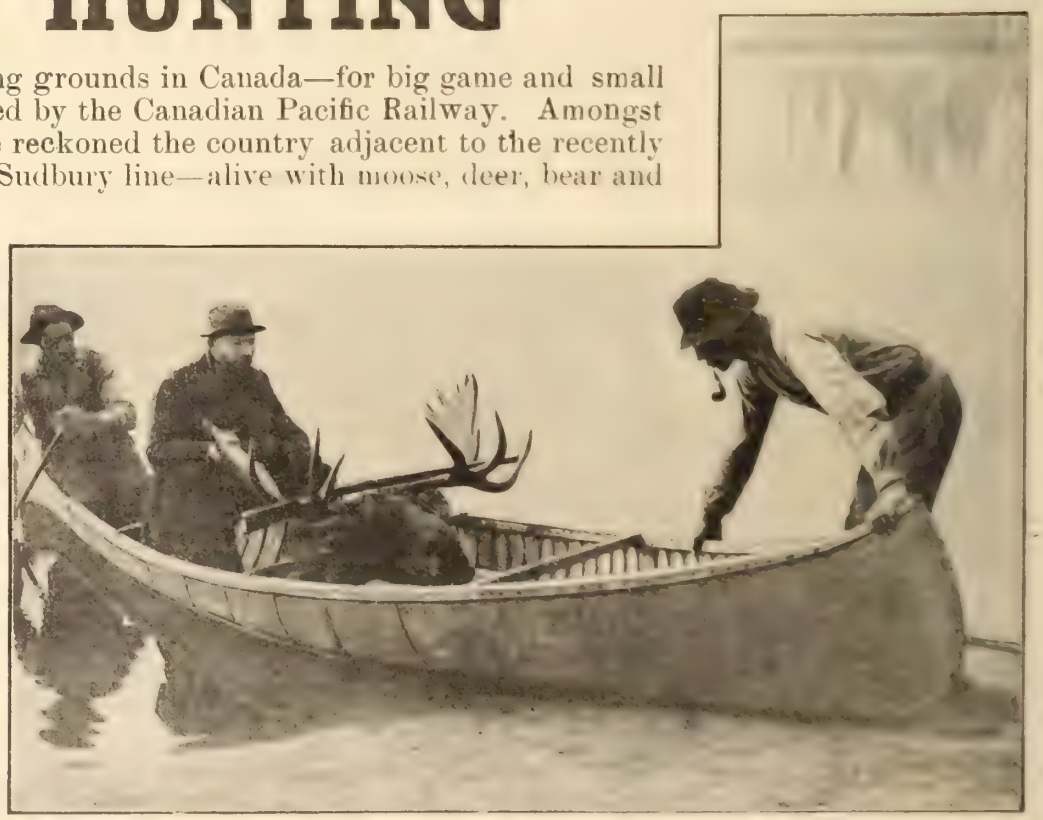
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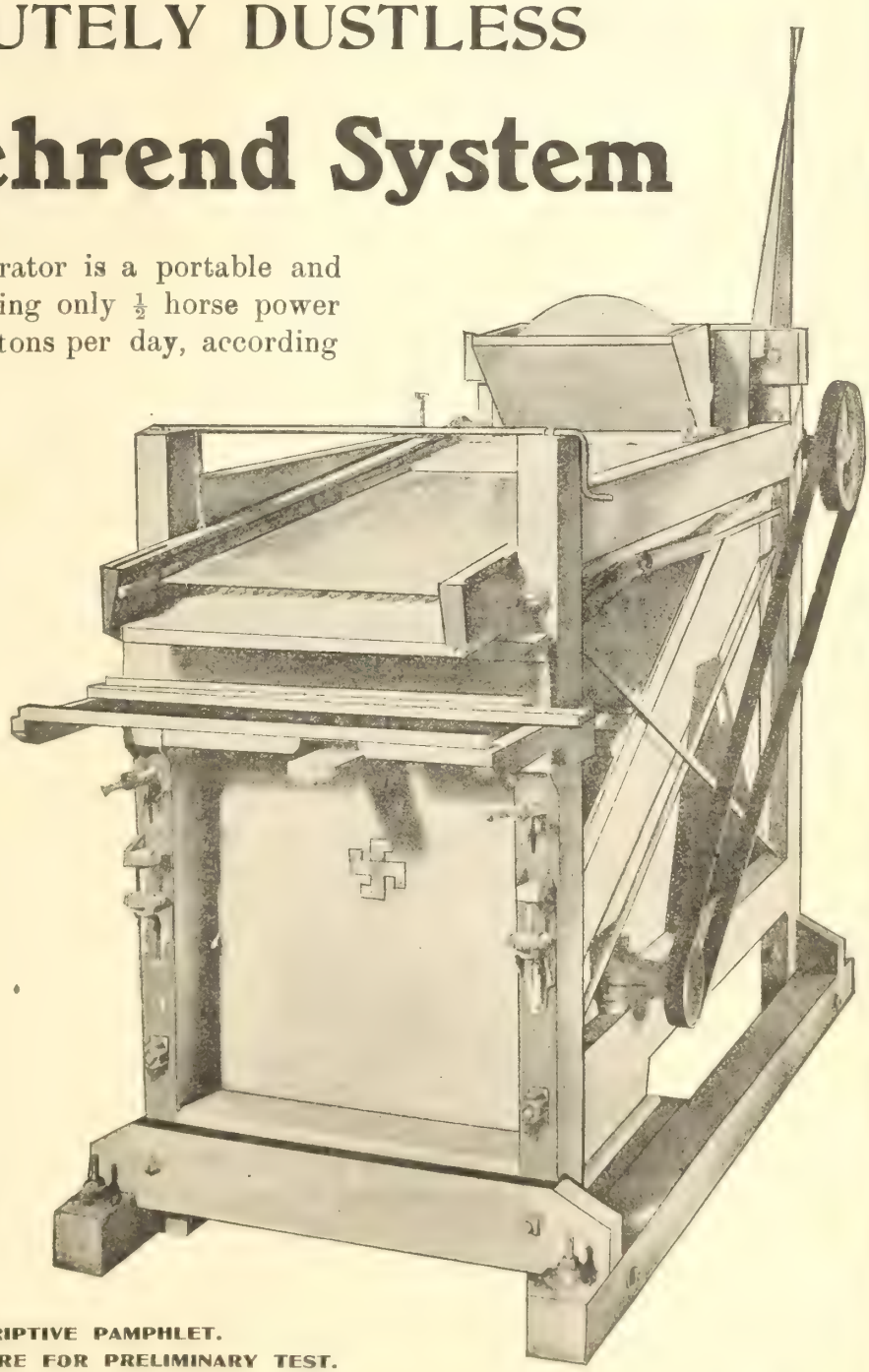
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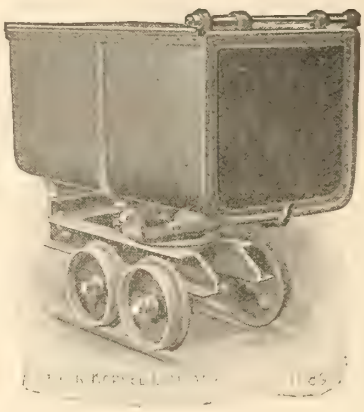
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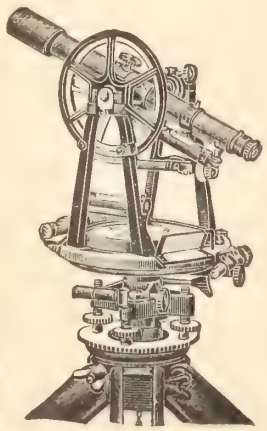
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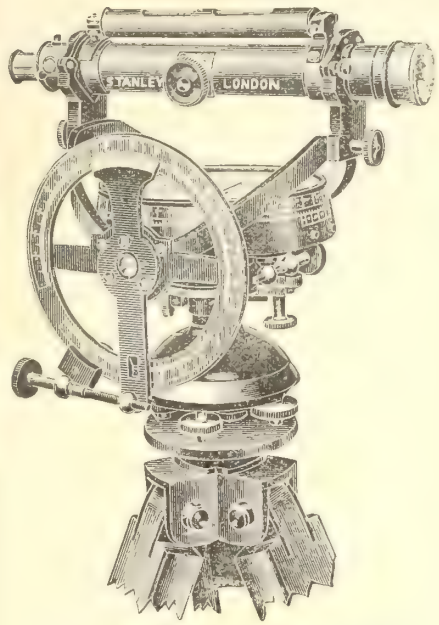
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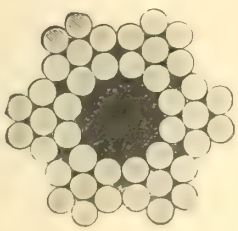
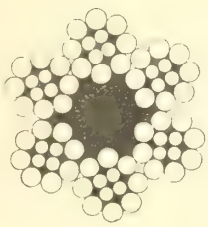
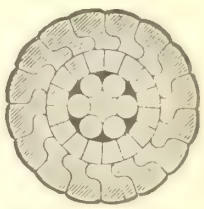


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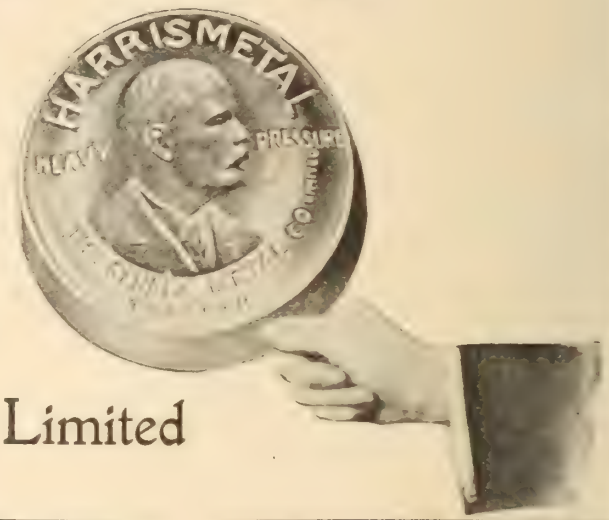
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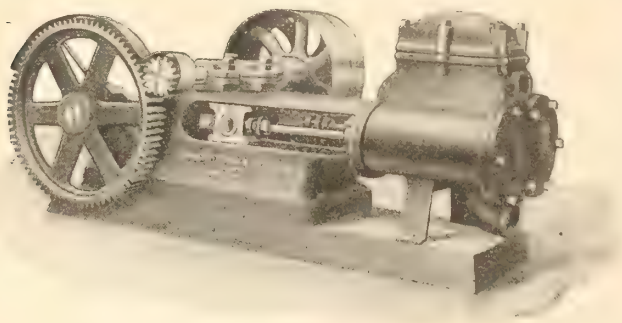


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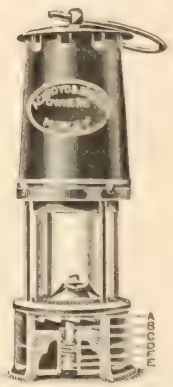
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO, September 15, 1908 No. 18

The Canadian Mining Journal

With which is incorporated the
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Devoted to Mining, Metallurgy and Allied Industries in Canada
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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

"Entered as second-class matter April 23rd, 1908, at the post-office at Buffalo, N.Y., under the Act of Congress of March 3, 1879."

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Natural Oil and Gas: Eugene Coste, M.E., Toronto, Ont.

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SHOULD MINING ENGINEERS ADVERTISE.

"Should Mining Engineers Advertise" is the title of a clear editorial exposition in the current number of the London Mining Journal. This is a question on which an English point of view is particularly valuable. In Canada we have a considerable body of mining engineers and mining geologists whose work will stand comparison with that of engineers from any other country. But neither our mining societies nor public opinion enforces distinction as between qualified men and charlatans. Whilst it is permissible for a Canadian mining engineer to insert a professional card in technical journals and in newspapers, it is recognized as distinctly bad form to seek louder means of attracting attention. For mining men of the lower grades the inspired newspaper interview is one of the chief means of advertising. Others, again, allow their names to be used on obnoxious prospectuses. Against both these latter devices self-respecting engineers set their faces. It is, then, probable that the limit marked for Canadian mining engineers is the professional card.

Our London contemporary, however, points out that "the mining engineer . . . is not assisted by analogy from other professions, and the question is one that must be decided upon its merits, as it affects the mining profession simply." After reference to the many indirect means of keeping one's name before the public, our contemporary alludes to the fact that the mining engineer, who has worked successfully in foreign fields, may be entirely forgotten by the very people at home to whom his services would be most acceptable. This opens up the way for a revision of the code.

Our own opinion is strongly opposed to countenacing anything but the most limited advertising. Attempts to establish a laxer code of professional etiquette must inevitably lead to demoralization.

This restriction may seem a hardship to the struggling engineer. But there remains a clean and profitable channel of publicity. A professional card does little more than actually remind the readers of public that a certain engineer is alive. But a signed technical or descriptive article, appearing in a suitable publication, places the author at once in a position of more or less prominence. If the article deals with mining or metallurgical problems encountered and overcome, and if is written simply and honestly, it constitutes the best possible introduction to that section of the public with which the engineer wishes to form an acquaintance. Moreover, the man who writes an article is, obviously, willing to risk the judgment of his fellows. Therefore a certain amount of confidence in himself (always a healthy symptom) is implied.

There is yet another equal benefit accruing to the engineer who takes thoughtfully to print. Writing clarifies the mind as nothing else can. For many it is a painful discipline; but discipline it is. The making of a well-written article involves looking up many references and consulting with as many professional friends as are available. Also the mere act of crystallizing one's thoughts on paper tends to fix what is essential and to delete what is superfluous.

Therefore we would urge Canadian mining engineers to form the habit of transferring their experience to paper, either for the purpose of publication or as a record for personal reference, or, better, to serve both these ends.

We have urged this before. Our contemporary's able editorial lends us a cogent argument wherewith to impress our point more deeply.

ONCE MORE A BOOM.

There is a tendency in well-informed circles to attribute the present boom in Cobalt stocks to the skilful tactics of certain Toronto and New York interests. That well matured plans have been formulated and carried out has been patent. Specialists in publicity, when retained by stock manipulators, do not hide their searchlight under a bushel. But, although these fluent gentlemen have undoubtedly assisted in precipitating the movement in stocks, there were other influences, far more potent, at work.

One of these was the fact that ore shipments from Cobalt during the first eight months of 1908 were greater by 4,211 tons than those for the corresponding period of 1907. The totals stand 13,217 tons for the first eight months of 1908, and 9,006 tons for 1907. If, as is probable, shipments continue at this rate, the total tonnage for 1908 will reach 20,000 tons, an increase of about forty per cent. over the preceding year. Moreover, it is possible that this tonnage may be increased, as the monthly returns have lately been growing consistently.

Last year the value per ton of ore shipped from Cobalt was approximately $500. There is reason to believe that the ore being shipped at present is worth slightly more per ton than this. The recognized tendency of shippers to concentrate before shipping, and the bonanza character of ore from several of the mines, support this belief. Arguing from such grounds, it is apparent that at the close of 1908 Cobalt will have an annual output worth at least $10,000,000 to her credit.

This is, naturally, a pleasant fact to contemplate. It means that steady, serious, and honest work is being done at most of the producing mines. But it also means that Cobalt is quite able to stand on her own merits. There is, therefore, no need of a flourish of trumpets. Indeed, Cobalt, as a reputable mining town, one that has already cleaned out much of the disreputable element that clings to the skirts of new and prosperous mining communities, does not welcome the boomster.

If we read aright the signs of the times, a general reaction in the direction of better conditions is setting in. The London Stock Exchange is witnessing a rapid appreciation in South African mining shares. Activity in our own mining stocks is apparent in New York, Montreal, and Toronto. These movements could not have been entirely caused by manipulators. But, especially in this country, they can be caried to an illogical and harmful extreme by men who can command the assistance of our venal daily papers.

The public should have learned its lesson two years ago. Probably it did not. Probably, also, a boom once started will not lose its momentum until grave mischief has been wrought.

In all stock excitements the public is the chief loser. When the wave of recklessness recedes the mining industry is invariably found to be in a worse condition than it was before the boom commenced. Therefore it is the duty of all those who have the good of Canada's mining industry at heart, who wish to see our mines and smelters firmly established in the confidence of the people, to do what they can to offset the extravagant methods of imported promoters and their hirelings.

We have all the elements of success. We have rich mineral deposits, capable mining men, good markets, and, in the main, honest government administration. Our progress to be constant must be reasonably slow. There is nothing to be gained by brain-storms.

ONE COMPANY.

To mark their interest in the visit of the Canadian Mining Institute to Nova Scotia, the directors of the Nova Scotia Steel and Coal Company issued a pamphlet in which is given a most interesting history of the beginnings and growth of their enterprises together with an account of the present condition of their plants and mines.

This is not only sound policy on the part of the Company, but is indicative of enterprise and enlightenment. The visitors, who represent the best mining interests of Canada and Europe, were deeply impressed with what they saw in Nova Scotia. But a record of the quiet and efficient development of the Nova Scotia Steel and Coal Company's undertakings is unquestionably more impressive than a mere inspection of their plants and mines in operation. When it is more fully understood that industries should be based upon organic growth and not upon the speculative hankerings of the public, then we shall have more business ventures and fewer incubated indiscretions.

The Nova Scotia Steel and Coal Company had its beginnings in a blacksmith's forge. To-day there are 4,200 men on its payroll. It owns and operates its own iron and coal mines, and pays dividends.

A PERVERSION.

Nothing could be more distasteful to the British and European delegates and to their hosts, the members of the Canadian Mining Institute, than to know that their visit to Cobalt or any other camp could be used by writers in the daily press for the purpose of influencing the stock-market. The summer excursion of the Institute had an object entirely remote from this. In fact it is not overstating the case to say that such excursions are planned as a corrective to the evil that stock-jobbers have already done.

We therefore feel called upon to resent certain paragraphs appearing in Toronto newspapers in which the statement is made that "the mining engineers' visit to Cobalt . . . will have a favourable influence upon market values."

THE CANADIAN NATIONAL EXHIBITION.

In the early months of this year the CANADIAN MINING JOURNAL called the attention of the management of the Canadian National Exhibition to the need of paying more attention to the mining industry. The result has been that five Provincial governments sent along mineral exhibits. Two of these provinces, Nova Scotia and Ontario, despatched full and representative collections of their economic minerals. Quebec, New Brunswick and Alberta exhibited on a smaller scale, but all of the display was most interesting.

On another page will be found an acount of the several features of the mineral exhibit. It marked a most praiseworthy attempt to round out the scope of the Exhibition.

But the growing importance of the mineral industry warrants a greater amount of space and attention. We would urge upon the Exhibition Commission that the matter of erecting a special mining building be taken into immediate consideration. The need is pronounced for suitable housing for mineral exhibits and mining machinery.

ACTS AND THE MAN.

The Lemieux Conciliation Act has become an instrument of no little importance. Whatever its present deficiencies may be, its provisions are sufficiently flexible to permit of its successful application to many different species of industrial disputes. Its operation has proved one thing, however, that cannot be overlooked, and this is that much depends upon the wisdom of the chairman.

Professor Adam Shortt, late of Queen's University, now translated to an official billet at Ottawa, won rapid fame as an arbitrator. Peace, perfect peace, followed him as a river follows its channel. Urbane, dispassionate, incisive, his skilful diagnosis was followed by simple and proper remedies. Our body politic is the better for his work. Canada would be the gainer were Mr. Shortt a fixture on all Conciliation Boards. But this is not to be. Ottawa, with its precedence and piffle, its gold lace and guff, its functions and futilities, has swallowed our peacemaker.

THE SUMMER EXCURSION OF THE C. M. I.

In our Special Correspondence columns appears a short account of the visit of the Institute and its guests to Nova Scotia. In later issues the remainder of the journey will be dealt with.

The Mining Society of Nova Scotia spared no pains to give its visitors a profitable time. So far as the Toronto visit is concerned, while every member of the Committee did his utmost, most especial thanks are due Mr. P. W. Ellis, of Toronto, through whose kindness and enthusiasm a complete inspection of the power plants that centre around Niagara was made possible.

Thanks also to the Canadian National Exhibition Commissioners the visitors were well entertained while in Toronto.

In all things the excursion has been undeniably pleasant and successful.

WHY NOT INCLUDE THE EAST?

The Hon. William Templeman, Minister of Mines, accompanied by the Acting-Director of the Geological Survey, Mr. R. W. Brock, has completed a tour of the mining regions of Alberta and British Columbia. Bellevue, Coleman, Hillcrest, and Frank were visited in Alberta. Fire-stricken Fernie was touched, and southeastern British Columbia pretty well covered. No doubt the Minister and Mr. Brock, in whose hands lie in large measure the guidance of the Dominion's policy in these matters, will have acquired many new and useful facts. The Western Provinces may count upon added interest being taken in the growth of their mining interests.

We may suggest that a similar visit to Quebec and the Maritime Provinces would be timely.

In bridges and other structures of iron or steel, it often happens that some one of several parts in tension does not support its share of the load, and instead of the usual expensive and troublesome plan of taking down the parts and forging them in a blacksmith shop, Hasenkamp, a German engineer, purposes making the adjustments in lengths with the structure intact. His plan is to use thermit for heating the part in place. This material, a mixture of iron oxide and aluminum, is readily ignited, and it burns with an intense heat—which may reach 5,000 deg. F.—through the affinity of the aluminum for the oxygen of the iron oxide. Clamps are fastened to the steel part on each side of the spot to be heated. These clamps are connected by bolts, and when the right temperature is reached turning the nuts shorten the steel permanently to the extent desired. The operation, requiring but a few minutes, does not interfere with traffic.

AN INTERESTING OCCURRENCE OF SCHEELITE IN NOVA SCOTIA.

By A. L. McCallum.

Early this summer, while engaged on some work in the Moose River district, I was shown a small sample of a yellow mineral in quartz, which had been found the previous autumn by Messrs. Reynolds & Currie, of Moose River.

I must confess that at first sight I did not recognize the mineral, and not having the means at hand for testing it, I laid it to one side.

Shortly after this Dr. T. L. Walker arrived in Moose River, looking for occurrences in Tungsten, in association with the Nova Scotia gold ores. Together we tested this mineral, and pronounced it Tungstite. Later, on coming to make an anlysis of the mineral, I found it to be scheelite, partly altered to tungstite, the two minerals being present in nearly equal proportions.

I suggested to the finders that further search be made in the section where this was found, which was done, and resulted in the finding by Mr. Reynolds of several more pieces of quartz carrying tunsten.

I then recommended the taking up of the property under a prospecting license, which was done, and active prospecting commenced by Mr. Reynolds.

At first, search was made for the yellow altered mineral, but up to the present no more of this has been found.

Soon after starting prospecting, however, a boulder of nearly pure unaltered scheelite was found in the bed of a small brook. Subsequently a considerable quantity of drift was found in this brook, and i na larger one 600 feet further west.

At this point I wish to pay a justly merited tribute to the thorough, systematic, I was almost going to say scientific, manner in which Mr. Reynolds conducted the prospecting operations, with the result that two weeks after the first boulder had been found the vein from which it came was located and opened up in several places.

This is the vein on which, up to the present, most work has been done. It has been traced east and west for a distance of over 600 feet, and two small trial pits sunk on it, from which over two tons of ore have been taken. An average sample of this ore yielded the following result on analysis:—

Silica	29.29%
Tungstic acid (WO_3)	44.10 "
Lime	12.70 "
Arsenic	3.43 "
Sulphur	1.46 "
Oxide of iron and alumina	7.70 "

The vein occurs in a slate belt 3½ feet wide, between whin walls, dipping north at an angle of 75 degrees. The vein is situated on the foot wall, and occurs in a series of lenses of varying sizes. These lenses are of all sizes from seven inches down, and will average about three inches. The scheelite is intimately mixed with the quartz, and is evidently contemporaneous with it. There is also generally some mispickel present.

Frequently lenses of pure scheelite are encounferd. An anlysis of this yielded the following figures:—

Tungstic acid	79.84%
Lime	20.11 "
Specific gravity	6.10

The slate near the vein is heavily impregnated with crystals of mispickel, while that towards the hanging wall is practically free from it.

South of this vein four others have been located, running parallel to the first. Two of these are about the same size and quality as the first, and the other two are larger, 12-14 inches, and of lower grade, the scheelite occurring on the outside of the vein, and seems not to have penetrated to any great distance.

Quite recently some rich drift has been found north of the first-mentioned vein, thus indicating the presence of still another vein. As the glacial striae at this point runs almost direct north and south, I think it is safe to conclude that the vein from which this drift came is north of the point at which the drift was found.

I thought that this occurrence was of sufficient interest to warrant the foregoing brief description. It is the first time in Nova Scotia that a vein has been discovered in which the predominating mineral is scheelite. There was, I believe, an isolated occurrence of scheelite at Malaga, but not in convenient quantities.

There is no reason that I can see why it should not be found in some of the Nova Scotia gold districts, as there is no evidence of anything out of the ordinary in the formation when this scheelite occurs. The fact probably is that the mineral has been overlooked, as the only characteristic that would draw attention to it is its high specific gravity. In appearance it looks exactly like the calcite that frequently occurs associated with the quartz.

I have frequently had to test samples this summer before I could be sure whether they were calcite or scheelite.

UNIFORM AND SYSTEMATIC COAL MINE SAMPLING.

In "Contributions to Economic Geology," published by the U. S. Geological Survey, J. S. Burrows takes up the question of uniform and systematic coal mine sampling.

The tendency in coal mine sampling is to secure samples that are much cleaner than the coal as it is mined. Thus the sample does not correspond to the commercial product. Exhaustive tests, covering a whole year's work, show that the usual method of mine sampling cannot be relied upon to represent the average commercial product of the mine.

One of the important features of the work of the Survey's fuel-testing plant at St. Louis was the careful sampling of carload lots, and the checking of each car by means of comparison with corresponding mine samples.

The cars of coal were unloaded into a roll crusher with the rolls set 1½ inches apart, the coal falling into the boat of a bucket elevator. As the buckets of the elevator moved upward to the storage bin a sample was taken by a man with a small shovel from about every eighth or tenth bucket. This was continued until the car was emptied. The sample in a tightly covered iron bucket of 80 to 100 pounds capacity was sent to the laboratory, and there pulverized and quar-

tered down to requisite size. This method gave the most uniform results.

In mine sampling the sample was crushed in the mine immediately after taking it, thus ensuring no loss of moisture, as in the mine atmospheric conditions are generally constant.

Two or more places were selected at widely separated points on the mine where the coal bed had an average development, and from which most of the coal was being mined for shipment. At one of these places the face was cleared of burned powder, loose coal and idtr for about five feet, and insecure pieces of the roof were taken down to prevent their falling into the sample. Then a waterproof blanket was spread on the floor of the mine close up to the face, and a perpendicular cut from floor to roof was made, including everything in the sample, except the parts of the bed discarded by the miner. Sufficient coal was cut to make not less than five pounds to the foot in height—that is, a sample weighing not less than 20 pounds would be cut from a 4-foot bed of coal, and a sample weighing at least 30 pounds from a 6-foot bed. When shale or other partings were to be included in the sample, great care was exercised to cut them the full width and depth of the groove, in order to preserve the proper proportion of coal and extraneous matter. After sampling, a careful measurement was made of the vertical section of the bed, every parting and variation being noted, and those not included in the sample being clearly shown. This formed a valuable check on the value of the sample.

The cuttings were at once weighed and then sifted through a half-inch mesh screen. The remaining lumps were broken on a portable buckboard and the entire sample put through the screen. After thorough mixing of the sample in the blanket it was quartered down to suitable size. It was then spread in a circular mass about two inches deep, and with a small trowel the mass was carefully sampled. The sample, being placed in a can, was hermetically sealed with insulating tape and despatched to the laboratory.

The entire operation was carried on with as great rapidity as practicable, so that there would be little or no loss in moisture.

From systematic tabulation some interesting general conclusions were arrived at and empirical factors adduced for correcting the results of the analysis of mine samples.

For instance, run of mine moal containing less than 5 per cent. moisture will, under normal conditions, gain moisture when exposed to the weather, and if the percentage of moisture in any mine sample of such coal be multiplied by the co-efficient 1.10, the probable amount of moisture in commercial run-of-mine will be found. Coals containing more than 5 per cent. moisture in the average mins sample show a decided loss of moisture in the car samples. The co-efficient for this class of coal is 0.93.

For coals containing less than 3 per cent. sulphur the co-efficient is 1.07. For correcting mine samples of coals containing more than 3 per cent. sulphur the co-efficient is 1.05.

Similarly, for correcting a determination of ash in mine samples of coals containing less than 7 per cent. the co-efficient is 1.618, and for coals whose ash exceeds 7 per cent. the co-efficient is 1.283.

These figures are all for run-of-mine coal. Co-efficients were determined for screened and slack coal also. The following table gives all of these:—

Co-efficients for Correcting Mine Samples Approximately to Commercial Coal.

Moisture—	
For run-of-mine coal with less than 5 per cent. in mine sample	1.19
For run-of-mine coal with more than 5 per cent. in mine sample	0.93
For screened coal (lump, egg, nut, etc.)	0.97
For slack coal	1.30
Sulphur—	
For run-of-mine coal with less than 3 per cent. in mine sample	1.07
For run-of-mine coal with more than 3 per cent. in mine sample	1.06
For screened coal	1.10
For slack coal	(?.0.90
Ash—	
For run-of mine coal with less than 7 per cent. in mine sample	1.62
For run-of-mine coal with more than 7 per cent. in mine sample	1.28
For screened coal	1.37
For slack coal	1.86

METHODS AND MORALS.

ALEX. GRAY.

The financial page of the Globe, Toronto, a journal ordinarily careful, yet unwilling to forego reading matter advertisements of very doubtful origin and purpose, contains the following among other things with special reference to Larder Lake district mines:—

"CANADA'S CHANCE. If Canada would only assist her miners by liberally investing in the stocks of her own good mines, or, in other words, finance the development of her own mines, she would soon be one of the richest countries in the world. But unfortunately her people lack to a great extent the knowledge, the money and the courageous enterprise necessary. Consquently millions, yes, hundreds of millions, of our own native wealth go to swell bank accounts of other countries. Is not this deplorable? Take, for example, the case of some of the mines at Larder Lake. Half a million dollars would put any one of these wonderful discoveries in a position to turn out by stamp mill and cyaniding process tens and even hundreds of millions of dollars of our native gold. However, if the general public had the knowledge and enterprise, I believe this money shortage would be overcome to a very favorable extent. But let Canada not lose sight of the fact that although some of her mines have failed, she has many of the best mines in the world, and many yet awaiting the assistance of investment.

"Wake up, Canada, ere your gold, silver and other valuable mines are all gobbled up by foreigners."

Because the Globe has never given its editorial sanction to what made Cobalt and Larder Lake unsavory, and for the further reason that it has refrained from questionable tactics so characteristic of some of its contemporaries,* the utilization of its financial page in the manner quoted has occasioned adverse comment. Not that Larder Lake ventures can be resuscitated by such ludicrous fanfaronades, or the despised "Sassenach" and "foreigner" influenced either way by crude tarradiddling. To the contrary, the palpable object has defeated the attempt. Alien ownership will be welcomed, since Canadians of wealth are really alienated from worthy mining ventures by reckless touts. Consequently, the volume of Canadian business in the Northern Ontario district shares is insignificant in comparison with that of the American, British, and German "foreigner," and were it otherwise, were Dominion capitalists relied upon to do the "gobbling" there would be "For Rent" signs on mining brokers' offices and little but snowballs on brokers' menus. The despised "foreigner," therefore, is not in the disfavor alleged, unless it be for his tardiness in not "gobbling" more of "the lemons" and leaving promoters the equivalent in cash—the kosher.

To "wake up" with "millions, yes, hundreds of millions," of "native gold" would not "swell" anything but the membership of violent patients in institutions for the incurably insane. Canadians have not heretofore been suspected of "lacking to a great extent the knowledge, the money and the courageous enterprise necessary." Larder Lake advocates might take issue with the discretion exercised by their compatriots, but of the latter's "knowledge" in this particular instance there can be no dispute. They "know;" they have "the money," and they have "the courage" to keep their money—until papers like the Globe voice the opinions of responsible engineers and veto the vapourings of the viciously *soufflant*.

Practically every mine at Cobalt was found by a Canadian. That "the foreigner" of England and the States was requisitioned for his money or to "wake the market" is no proof of ignorance or cowardice. The three great precious metal mines—the Leroi, St. Eugene and the La Rose—were discovered by French-Canadians. That they are held in the States and in England is no argument why "half a million" should be airily experimented with. Perhaps Canadians might have made more had long-distance telephone communication between New York, Buffalo, Syracuse and elsewhere been less convenient. Maybe Canadians were wise to take wholesalers' figures and leave it for others to make profits on "the turnover." Canada has benefited. The mining industry has its colicky features and teething troubles withal, but if "the foreigner" had "gobbled" more of Larder Lake and less of merit at Cobalt, mines and moose pasturage in the markets as mineralized areas, would be worth about fifty cents a mile for some time to come. However, Canadians have their share of shipping mines, courage and cash without recourse to the "hundreds of millions" in solution, *vide* the following:—

On the Cross Benches.

La Rose, University, Lawson, Violet, Princess

Canadian Control.	**"Foreign" Control.**
City of Cobalt,	Colonial Silver,
Cobalt Lake,	Townsite,
Coniagas,	Kerr Lake,
Crown Reserve,	King Edward,
Drummond,	McKinley-Darragh,
Foster,	Peterson Lake,
Nancy Helen,	Nipissing,
O'Brien,	Nova Scotia,
Right of Way,	Cobalt Central.
Silver Queen,	
Silver Cliff,	
Temiskaming,	
Hudson Bay,	
Trethewey.	

Is it possible that Canada is bereft of common sense in preserving the equilibrium at Sudbury, Cobalt, Copper Cliff, Doloro, Thorold, Perth Amboy and Denver, and leaving "fly belt" "multi"-millionaires to become maudin? Leave it to the Globe to decide!

*EDITOR'S NOTE.—We cannot agree with Mr. Gray's statement. The *Globe* has probably done more harm than any of its contemporaries because its pretensions are greater.

METHODS OF CONCENTRATION AT COBALT, ONTARIO

By Geo. E. Sancton.

Paper read at Cobalt Branch Meeting of Canadian Mining Institute, May, 1908.

At the present time there are three concentrators in active operation in the Cobalt Camp; namely, those at the Buffalo, the Cobalt Central and Coniagas Mines. In addition has been established an experimental mill at the McKinley-Darragh-Savage Mines of Cobalt, not at present in use, and the Muggley concentrator, a customs mill which is not yet in readiness for operation. All of these plants are wet concentrators, in contradistinction to those in which the ore is concentrated in a perfectly dry state. Of this latter class of mill there is one in the camp—a custom concentrator which has not yet been put into service.

In a great many respects all of the three first mentioned mills employ the same method of treating the ores from the mines. The veins in the camp being comparatively narrow, none of the mines are able to so mine their ore that the underground work is done in vein matter only. At the mines in which the concentrators are installed, it is the custom to make in the mine a rough separation of the high grade ore from the rest of the material. This high grade ore is hoisted to the surface and sacked, as on account of its richness it needs no concentration. The remainder of the material is composed of a mixture of high grade ore, rock and ore of low values, and is hoisted and sent to the mill without any further picking or sorting. From this point the methods of treatment vary slightly in the different mills. The following is an outline of the

manner in which the ores are concentrated in the three mills which are now working, and of the proposed method of treatment at the Muggley concentrator.

The Buffalo Mine.

The ore to be concentrated is lifted from the underground working to a trestle, from which it is trammed directly in, over the main ore bin, at the highest point in the mill, and dumped over a 1″ space grizzly, which removes some of the fine material, which it is unnecessary to pass through the coarse crusher. Passing through the main crusher, which is 6 x 20 Blake set to reduce ore to about ⅞″ size, the ore is elevated to a revolving trommel fitted with three sets of screens. These screens are of perforated metal with ⅝, ½ and ¼″ holes respectively. Oversize from the ⅝ screen and the product of the 1″ grizzly pass on to the fine rolls, which are spring rolls 20″ diameter by 20″ face. The materia lunder ⅝ and over ½″ and the material under ½″ and over ¼″ is treated separately on 3 compartment Hartz jigs. The material under ¼″ passes over an impact screen fitted with 20 mesh wire screen, the product over the screen going to a third Hartz jig and the fines through the screen going to cone settler and thence to a Wilfley table. The middlings from this Wilfley table are returned to the table; the tailings are split up, the coarser portion being treated on a Deister slime table.

The tailings from all the jigs feed into a six-foot Chilian mill and are reduced so as to pass through a 20 mesh slotted screen. The product of the Chilian mill passes over an impact screen fitted with 80 mesh wire screen, which removes the greater portion of the slimes, to be treated on a Deister slime table. The material which passes over the 80 mesh screen is fed on to four Deister tables, the tails from which, being of low value, go to the dump. These tails may later on be further treated by the cyanide process if sufficient silver remains in them to warrant it. At the present time about 40-50 tons of ore are being treated per twenty-four hours, the capacity of the mill being limited by the fine rolls. With fine rolls of greater capacity the mill would handle over 75 tons per twenty-four hours, provided more concentrating tables were insalled also. The amount of ore treated in a given time varies greatly, as ores from some parts of the mine will go through the mill much more quickly than ores from other parts. A Corliss engine of 150 h.p. is used in driving the machinery.

The Cobalt Central Mine.

The ore is trammed directly from the mouth of the shaft to a large bin from which the main crusher, a 10″ x 10″ Blake, is fed, the crusher discharging directly into the mill bin. From the mill bin the ore is fed by a plunger feeder to the roughing rolls, 42″ diameter by 14″ face, from which the ore is elevated to a 2 mesh trommel. The oversize from this trommel is returned to an oversize bin. When a sufficient quantity of oversize accumulates in this bin, the feed from the mill bin is shut off and the material from the oversize bin is fed into the large roughing rolls. The material passing through the 2 mesh trommel goes on to a No. 1 centripact screen fitted with 8 mesh screen cloth. The oversize from No. 1 centripact screen is treated on two Hartz jigs; the tails from the first are dewatered and reground by 10″ x 32″ finishing rolls, and the tails from the second are recrushed by 14″ x 30″ rolls, the products of the two sets of rolls uniting and being carried by a 7 x 12 elevator to the No. 2 centripact screen fitted with six mesh wire screens. This product, previous to being elevated, passes through dewatering screens to remove excess of water. The oversize from No. 3 centripact screen passes to one of these dewatering screens previous to being reground by the 14″ x 30″ rolls. The undersize from both the No. 1 centripact and the No. 2 centripacts feed on to No. 3 centripact screen, which is fitted with No. 16 wire screening. The oversize from this screen is reground in the 10″ x 32″ rolls, the material under 16 mesh meets the water from the dewatering screens and goes to two 20″ hydraulic classifiers and the sands from these classifiers are treated on four James tables. The overflow is settled in two Callow settlers and the thickened pulp is treated on two other James tables. The overflow from the Callow settlers, being practically clear water, goes to waste. The middlings from all six James tables are re-treated on the seventh James table; the tails from which, being of low value, go to the dump.

The mill, with average ore, is capable of handling about 50-60 tons per twenty-four hours. Of the values extracted about 70 per cent. are recovered by the jigs. In this mill all the fine grinding is done by rolls, the 10″ x 32″ rolls being set to crush to not over 16 mesh. The James tables are designed to also handle any slimes settling on a section of the table, which is left smooth and practically flat. On this section of the table most of the values in the slimes are extracted. There is, however, very little work for this part of the table to do and the quantity saved on it is not great. On the average the tails from the James table runs not over four to five ounces per ton. This mill is also driven by a 125 h.p. Corliss engine.

The Coniagas Mine.

The ore will eventually be raised from the mine in a skip and dumped directly into the mill storage bin through a long chute. Ore is first crushed in a 10 x 16 crusher, elevated, passed over a grizzly, recrushed by a 7 x 13 crusher and discharged into a storage bin. From this storage bin the ore is reduced to ¾″ by No. 1 rolls and elevated to No. 1 trommel, which has ¾″ and 5/16″ perforated steel screens. The oversize is returned to No. 1 rolls, which are 10 x 30; the oversize from the 5/16 and under ¾″ goes to two sets of Hartz jigs, the tailings from which are recrushed in No. 2 rolls. The undersize from the 5/16 screen goes to No. 3 trommel fitted with 3 millimeter screens. The oversize returns to No. 2 rolls; the product over ¼″ and size from this trommel goes to fine jigs, the tails from which go to a 5′ Huntington mill fitted with about 20 mesh slotted screens. The product from the 3 m.m. trommel, less than 3 m.m., is classified, the sands being treated on a Wilfley table and the slimes on a Frue vanner. The tails from the vanner also go to the Huntington mill. The tailings from the coarse jigs, after being recrushed in the No. 2 rolls, which are also 10 x 30, are elevated to No. 2 trommel, which is fitted with ½″ and ¼″ perforated metal screens. The over- under ½″ is ground in a ball mill fitted with about 20 mesh screen. The product from the trommel, which is under ¼″, goes to the No. 3 trommel previously mentioned. The materials from the Huntington mill and from the ball mill, crushed to 20 mesh and finer, unite and go to a classifier, the coarser product from which is treated on four No. 2 Deister tables. The tailings from the Deisters go to waste, the middlings being retreated on a Wilfley table. The overflow from the clas-

sifier goes to a Callow settling tank and the thickened pulp is treated on a Frue vanner. The mill is driven by a Robb engine of about 100 h.p. capacity.

The Muggley Concentrator.

Ore to be concentrated will be taken up the incline tramway to the top of the mill and fed into a No. 4 style K. Gates crusher. From the crusher the ore will be fed into a set of Gates economic rolls, which crush to ¾" and under. The ore will then pass over a screen with 1⅛" openings and go to a two compartment bull jig. The tails from the bull jig will be elevated and discharged by a belt elevator to the ore bins from which they will be fed by Challenge feeders to twenty 1,250 pound stamps. The mortars will be fitted with screens approx. of 20 mesh and the stamped material will be elevated to Richards annular vortex classifiers. The spigot product will be treated on four Wilfley tables, the overflow going to two 8′ callow tanks. The tails from the Wilfleys will be re-treated if found of sufficient value. The thickened material from the callow tanks will be treated on corrugated belt vanners, the tails from which will unite with the middlings from the Wilfley tables and go to 8′ settling tanks. The sands from the settling tanks will go to 8 'amalgam pans and to four 8′ settlers. The amalgam will be retorted and the tails let go to waste. It is estimated that the complete cost of treating ores in this mill will from $4.00 to $12.00 per ton. It may be found necessary to roast the ore previous to amalgamation, and if this is done it will likely reduce the cost of treatment.

When the subject of the treatment of Cobalt ores was first considered, the main difficulty was thought to lie in the prevention of the crushed material from sliming, the general opinion being that the ore would slime to such an extent that the loss of values in the slimes would be very excessive, while the actual process of reducing the ore to a fine state was not considered as being a very important one. But as a matter of fact this order has been practically reversed, as there appears to be no great trouble in getting a good extraction, though the actual fine grinding of the material has proved a problem of great importance. The coarser reductions give little trouble, as the material breaks along its fractures and, furthermore, accurate crushing to size is not altogether important. When it comes to the fine grinding, the rock is particularly difficult to reduce. The small particles seem to be exceptionally hard and the wear on the roll shells, or Chilian mill tyres, as the case may be, is very great, grooving taking place to such an extent that the capacity of the machines in the case of the Chilian mills and the capability to give a fine product in the case of the rolls is greatly reduced.

In connection with the fine grinding there is one mill, the erection of which is contemplated, in which it is proposed to use stamps. This method has much to recommend it. The cost per ton of ore crushed would not likely exceed 30 to 40 cents per ton, and this we do not think can be bettered by either fine grinding with a series of rolls or with Chilian or Huntington mills. To drive either of these machines a much greater horse power is required and the upkeep is more expensive both for parts and the amount of labor required to keep the machines in order. Half a day's work on a small stamp battery putting in new liners and refitting with new shoes and dies will make the battery practically as good as new. To overhaul a Chilian or Huntington mill thoroughly would probably take over a week at the least. Some silver would no doubt accumulate in the mortar boxes, but this would be no serious disadvantage as it could be easily and quickly cleared out as often as was found necessary.

The assertion has been made recently by one of the mine operators in Cobalt that stamps have no place in a concentrator. This statement, in the writer's opinion, is very broad and possibly rash in view of the number of stamps working with apparent success in many parts of the world. His statement, it is understood, covered milling in general and not only the reduction of Cobalt ores. The success of stamps in general as a crushing medium has been well shown at the Michigan Copper Company and other properties in the Lake country. For the fine crushing in connection with the treatment of the jig tailings on tables, we think that stamps will ultimately prove to be the best device.

The treatment of the tailings from the concentrating tables from the various mills by the cyanide process is a matter which is open to a large amount of discussion. In Mexico this has certainly proved a success, but the conditions in that country are much more favorable than those in this district. Unless the tailings carry much higher values than is said to be the case, it will require very cheap treatment to justify the installation of the cyanide plants for the treatment of tailings solely. In Mexico the climatic conditions are more suitable, and the cheapness of labor also bears a strong influence on the success of the process. There the operations are largely in the hands of mining engineers from the Rand, who, having seen the great success of cyaniding in South Africa, have carried their ideas to Mexico, and introduced them there in the treatment of silver ores.

In the Republic Camp, in Washington, they are treating an ore in which the values of silver and gold are about the same. It is found that the gold is easily leached out, but that the recovery of the silver is a matter of three or four days.

The actual extraction that would ultimately be made on the tailings here in Cobalt by the cyanide process is not questioned, but it will be at the expense of a large consumption of cyanide and the leaching out will be very slow on account of the comparatively large pieces of silver—large by comparison with the minute state in which gold is disseminated through the low grade ores in the Rand—which will require to be dissolved. At a great many of the mines in Cobalt, chalcopyrite is found to some extent and it would all mix with the ore going to the mills. This, when it finally reached the cyanide tanks, would tend to increase the consumption of cyanide. The question, however, of the actual success of the cyanide treatment here will largely depend on whether the tailings are sufficiently rich to stand the cost of treatment.

In connection with the primary crushing of the rock in most of the mills now running, and in most of the mills whose erection is contemplated, the Blake type of crusher seems to be preferred in preference to the gyratory crusher. In the Blake crusher the wear is practicall yconfined to two points, that is to say, at the lower ends of the jaw and wearing plates. For this reason the plates must be frequently renewed. In the gyratory crusher the wear is distributed over a far greater surface and the renewal of the concaves and the mantles is not necessary to the same degree. For a given amount of ore crushed the power taken is less; and, furthermore, the crusher head having a circular

motion in contrast to the reciprocating motion of the jaw in the jaw crusher, the strain on the supports for the gyratory is not nearly so great; and in case where the crusher is located in the upper part of the mill building the shaking and vibration due to the crusher is far less. This would enable the upper portion of a mill building to be made lighter, as it would not have to be so strongly braced to hold the crusher from oscillating.

For treating the Cobalt ores the simplest form of mill would first crush the ore to about 7/8" size in a Gates crusher. This product would then be passed over a bull jig, which to a great extent would displace the need of hand sorting. These tailings would then be crushed with rolls, roughly sized and treated on two jigs. The tailings from these jigs would then go to the stamps, so arranged that any of the tailings which were not of sufficient value to treat could be run directly to waste. The silver which accumulates in the mortars could be removed periodically, and the product after leaving the stamps, treated on Wilfley or other suitable tables and corrugated belt vanners. As the actual tonnage of concentrates produced would be comparatively small, it might be found profitable to treat these concentrates in amalgamating pans fitted with mullers for grinding. This would amalgamate a large amount of the native silver and the amalgam could be retorted and the buillion shipped. The concentrates from which most of native silver would be removed could then be shipped to the smelters and their treatment would cost far less than if the original concentrates had been shipped.

In this scheme very little mechanical screening is used, only a coarse sizing for the jigs being made. No fine jigging would be attempted on account of the leanness of the material; it would be better to allow the finer material to go direct to the stamps. Attrition of the small pieces might also be an objection to fine jigging. The extensive use of trommels, screens and other mechanical sizers, would add greatly to the costs of the upkeep of the mill as there is usually a great amount of wear attached to machines of this class. On account of the hardness of the ore milled the best and heaviest machinery on the market would be, there can be no doubt, the cheapest in the end.

NOTES FROM THE PROVINCE OF QUEBEC.

THE BROUGHTON ASBESTOS FIBRE COMPANY.

This company was the first in the Broughton district to build a mill, and has been operating continuously for over six years. The two principal pits are located along the southerly contact with the schist formation, and have now a depth of from 65 to 90 feet. The mill, which was entirely overhauled and enlarged last year, contains three cyclones, and treats from 350 to 400 tons of asbestos rock in double shift. The mill rock is transported in 4-ton self-dumping cars, and handled by small locomotives to the mill, a siding connecting also the latter with the main track of the Quebec Central Railway. The construction and layout of the mill embodies a number of effective designs and improvements especially adapted to the peculiar conditions governing the occurrence and extraction of the Broughton fibre, and are the result of diligent studies on the part of Mr. H. Williams, the energetic manager of the concern.

THE QUEBEC ASBESTOS COMPANY.

This mine has been in continuous operation since 1904, and has contributed largely to the asbestos output of the Broughton district. The main pit measures 300 by 100 feet, with a depth of 75 feet, and is located along the southerly contact with the schist formation, which strikes here northeast-southwest. The serpentine is much fissured, and little powder is used to break the rock. The fibre is the regular Broughton slip-fibre, and fills the fine cracks and slickensides of the bright green serpentine. The mill is in operation day and night, about 150 tons of rock being treated as an average, yielding from 7 to 10 per cent. of fibre. Forty-five men are employed.

THE FRONTENAC ASBESTOS MINING CO.

This company, which owns 108 acres of asbestos ground right near the station of East Broughton, is at present engaged in the construction of a 500-ton mining and milling plant. The asbestos deposit is located towards the middle of the property, and has been laid open along the southern contact of the schist formation in a northeasterly sense for a length of 600 feet and a width of over 100 feet. The mill building measures 102 by 60 feet, and the dryer building 70x40 feet. A fine piece of trestlework has been completed, upon which the receiving tracks for the mill rock will be laid. Four cable derricks are being installed, conveying the rock to dumping cars, hauled by small, geared locomotives to the ore bin of the dyer. A special feature of the mill is the ore bin, placed between dryer and mill. This bin is one of the largest in the asbestos district, its capacity being about 800 tons, and by reason of its extra solid, substantial construction on heavy concrete foundations, is favourably commented upon. Machinery will soon be installed, four cyclones will treat the rock, and the combined milling capacity will be 500 tons. Mr. H. Riehle, M.E., is the general manager of this company and the designer of the large surface plant. Thirty men are engaged in construction work.

THE BOSTON ASBESTOS CO.

This company commenced operations less than a year ago on the property adjoining the Frontenac to the east, and have almost completed a substantial 300-ton milling plant located alongside the track of the Quebec Central Railway. The main pit runs along the southern contact with the schist formation, at a distance of about 600 feet in a northerly direction from the plant. A cable derrick transports the rock to self-dumping cars on an inclined tramway leading to the dryer building. This contains a large Campbell dryer of the latest design and the necessary jaw crushers. The rock passes then into storage bins, then through a huge Sturtevant crusher, two fibrizes, and finally through two cyclones. The power plant consists of two Jenckes boiler and a straight compound Corliss engine of a capacity of 450 horsepower. A siding connects the railway with the mill. Mr. A. A. Normandin is the general manager of this company.

A recent noteworthy discovery is an asbestos deposit on lot 13c, range 5, Broughton, belonging to Mr. A. A. Normandin. This deposit is remakrable by reason of its peculiar deposition of asbestos fibre, and also its richness. A pit 15x25 feet on the surface in a highly fissured pale green serpentine discloses the nature of

the deposit; a decidedly white and silky fibre occurs abundantly throughout the rock, yielding, according to a conservative estimate, at least a fifteen per cent. extraction, besides a quantity of crude. There seems to be no question that this deposit is the richest individual occurrence in the district.

PROVINCIAL MINERAL EXHIBITS AT THE CANADIAN NATIONAL EXHIBITION.

The directors of the Canadian National Exhibition, which is the largest annual fixture of its kind in North America, have heretofore paid but little attention to securing a representative exhibit of Canadian minerals. Acting upon the suggestion of the Canadian Mining Journal the Commissioner determined to make a departure this year. To this end the Provincial Governments were approached and five of them sent creditable collections.



ONTARIO'S MINERAL EXHIBIT.

The Provinces that complied with the Commission's request were: Nova Scotia, New Brunswick, Quebec, Ontario, and Alberta. British Columbia and Yukon Territory will fall into line next year.

All of the mineral exhibits were attractive. Those of Nova Scotia and Ontario were particularly comprehensive and well arranged. Quebec and New Brunswick sent smaller consignments of minerals. Alberta's display, arranged in conjunction with that province's magnificent wheat exhibit, was composed of bituminous, coal, lignite, anthracite, coke, and briquettes. Descriptive literature was distributed by those in charge of the exhibits and there is no doubt that the mineral wealth of the provinces represented received wide advertisement.

ONTARIO.

Ontario's mineral exhibit was handled and arranged under the active direction of Mr. William Nicol, Professor of Mineralogy, School of Mining, Kingston, Ont. No more competent mineralogist can be found in Canada than Professor Nicol. Under his vigorous management the collection of minerals used at the Buffalo Exposition was augmented by important additions, and the whole was displayed with discrimination and sound judgment. It was fortunate indeed that the Ontario Bureau of Mines was able to secure the services of a

person so thoroughly enthusiastic and so unquestionably efficient.

We shall notice first the metallic minerals, and then the non-metallic, commencing, as might be expected, with the striking Cobalt ores and products.

O'Brien Mine.—From this famous mine came two slabs of native silver, and one magnificent mass of ore carrying native silver and cobalt bloom. Both of these exhibits were more than usually large and rich. The **Doloro Mining and Reduction Company,** whose smelter treats the O'Brien and other Cobalt ores, sent specimens of speiss, six silver ingots (999 fine), sample lots of dark and light crude arsenic, white arsenic crystals, refined arsenic, and cobalt-nickel residue.

Coniagas Mines, Limited, sent specimens of native silver and cobalt-nickel ores. **The Coniagas Reduction Company,** which bears the same relation to the Coniagas mine as does the Deloro smelter to the O'Brien mine, exhibited a silver ingot (998.4 fine), cobalt oxide, nickel oxide and refined white arsenic. The cobalt and nickel oxides are specimens of the first of these materials prepared in Canada.

La Rose Mines, Limited, displayed a large number of silver nuggets and four large masses of silver-cobalt-nickel ores, along with fine specimens of cobalt bloom.

Crown Reserve.—An imposing mass of native silver and calcite, calculated to contain about 33 per cent. of the metal and weighing 1,700 pounds, was purchased by the Ontario Government as a permanent exhibit. Its extreme width, as shown by the hanging and foot-wall faces, is approximately three feet, and it is typical of the Crown Reserve vein at its best. Ontario has made a good bargain in acquiring this magnificent and unique specimen. At the present low price of silver it will be a safe investment. The silver content will probably be estimated indirectly by a specific gravity determination. The specimen, in spite of its extreme bulk and weight, was ingeniously lowered upon a substantial plush-covered base and a glass show-case built around it. It is not probable that such an exhibit could be duplicated in any other part of the world.

The Laurentian Gold Mines, Wabigoon, Ont., had a rich exhibit of gold nuggets and gold in quartz, of a total estimated value of $4,000. Gold ores from other mines in western Ontario were included. Larder Lake was represented by specimens of ore sprinkled with visible gold from the Harris-Maxwell mine.

Iron Ores.—From the Bessemer mine, Hastings County, came exhibits of the fine granular, non-phosphatic ore of that region. Magnetites also from Moose Mountain and other localities were seen in this section.

Pyrite.—Specimens of the green ore, cinders and sulphuric acid prepared from the ore by the Nichols Chemical Company, Sulphide, Ontario.

Nickel and Copper.—A large and representative collection of ores, mattes, and metals from the Orford Company and from the Canadian Copper Company, Copper Cliff, Ontario. Copper ores were also exhibited from the McGowan mine, Sudbury District.

Zinc ores were displayed from the Richardson and Zenith zinc mines, Frontenac County, Ontario.

The **Canada Corundum Company** had a fine showing of crude ore of various sizes, corundum grains, and grinding wheels of different dimensions and fineness of grain, along with a collection of abrasive implements made from Canadian corundum.

Carborundum.—Samples of crystals of carborundum and various articles such as sandpaper, knife sharpeners, etc., were sent by the Carborundum Company, Niagara Falls, Ontario.

Mica.—Kent Brothers, Kingston, Ont., exhibited thumb-trimmed mica of commercial sizes, and large natural crystals. The General Electric Company, of Schenectady, N.Y., exhibited a collection of mica from their Lacey mine, Sydenham, Ontario.

Talc.—Masses of crude talc from the Henderson talc mine, Madoc, Ont., were accompanied by samples of crushed, ground, and bolted talc, prepared by Geo. H. Gillespie & Co., Madoc. This latter exhibit, from the only talc grinding mill in operation in Canada, attracted a great deal of favorable comment. Massive specimens of actinolite and soapstone from other parts of Ontario completed this section.

Gypsum.—Staff decorations and ornamental manufactured articles, manufactured from Haldimand County gypsum, by W. J. Hynes, of 16 Gould Street, Toronto, were shown in this section, along with a creditable exhibit from the Alabaster Company, of Paris, Ontario.

Portland Cement.—Samples of the raw material for both the dry and the wet processes as carried on by the Canadian Portland Cement Company at Port Colborne and Marlbank, Ontario. Also an exhibit of building materials manufactured from Portland cement by John W. Litton, Kingston, Ontario.

Graphite.—Specimens of ore from the Black Donald mine, Renfrew Ont.

Calcium Carbide.—Raw materials and manufactured products from the Ottawa Carbide Company, Ottawa, Ont.

Marble.—Two strikingly beautiful slabs of decorative marble and fifteen other samples brecciated marbles were contributed by the Ontario Marble Quarries of Bancroft, Hastings County, Ontario. The unique coloring of this marble caught the attention of visitors at once.

Sodalite from Princess Louise Mine, Bancroft, and **Fluorspar** from Madoc were also included.

The **Imperial Oil Company** had a complete exhibit of oils, paraffines, etc.

An important addition to the Ontario exhibit was a collection of the typical rocks and minerals of the Cobalt District. Mr. A. A. Cole, mining engineer to the T. & N. O. Commission, contributed this. Many of the cases used by Professor Nicol belonged to the School of Mining, Kingston, Ont.

NOVA SCOTIA.

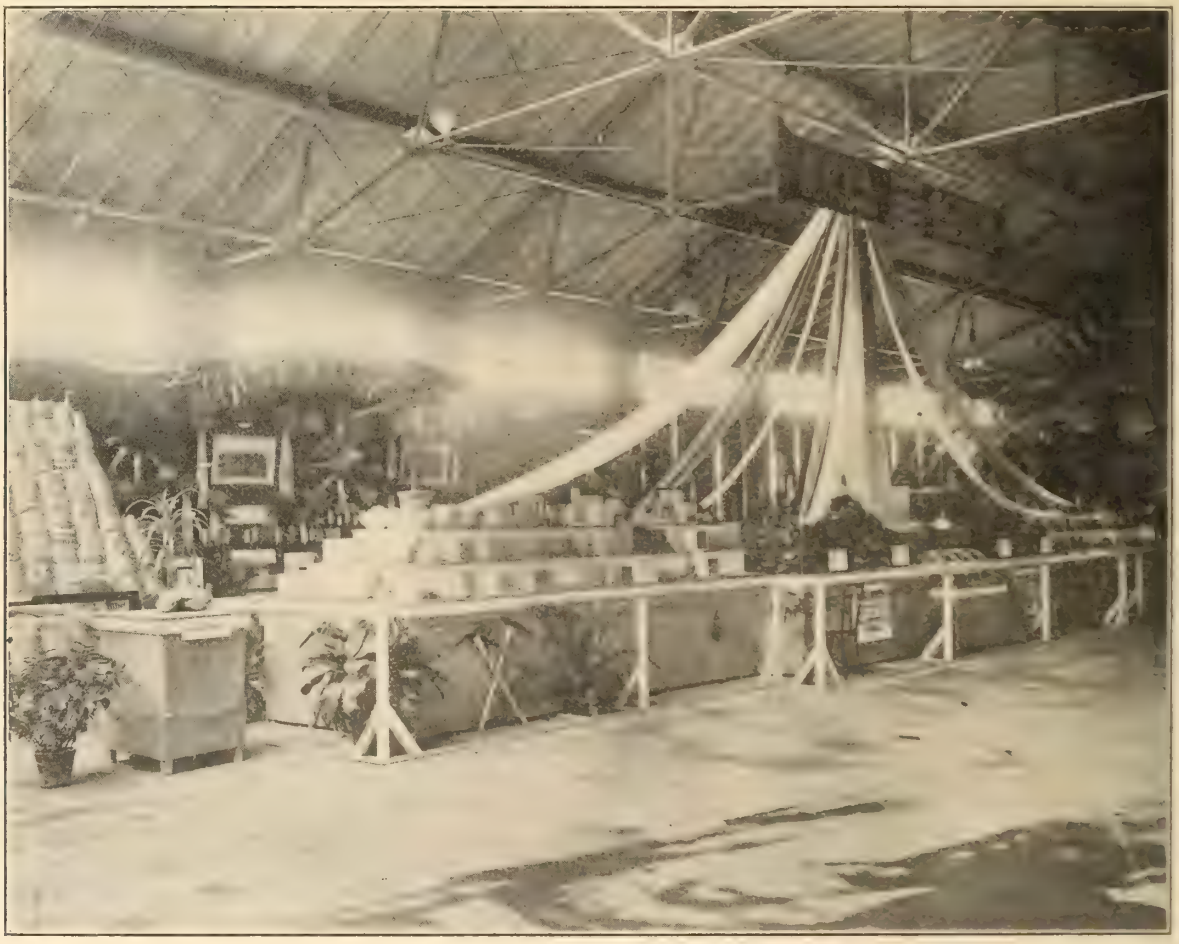
Nova Scotia's exhibit, arranged and prepared by Mr. Harry Piers, Curator of the Provincial Library, Halifax, N.S., was exceedingly well displayed. The notable variety of minerals included the richness of the gold specimens, and the substantial character of the well-designed frame upon which the specimens rested distinguished this most creditable representation. The central feature of the exhibit was a gilded column resting upon a gilded plinth, which together represented the bulk of the total gold extracted from Nova Scotia gold mines since the first discovery of the metal. From this column depended streamers and bunting.

Detailed description of this exhibit will be found on page 138 of the Canadian Mining Journal for May 15, 1907. Among recent additions to this permanent exhibit are specimens of scheelite from Moose River, Halifax County, N.S.

Both the Province and Mr. Piers deserve great credit for the energy and taste that has been used in getting together this collection.

QUEBEC.

The Quebec Department of Mines, on account of delays and pressure of other work, was unable to send a suitably large mineral collection. What was sent, however, represented the most important industries.



NOVA SCOTIA'S MINERAL EXHIBIT.

A gilded shaft from which streamers depend represents the total output of gold from the Province

Asbestos.—Large exhibits of crude asbestos and the different grades of milled product were made by the following companies: Beaver Asbestos Co., Bell's Asbestos Co., Standard Asbestos Co., Dominion Asbestos Co., Johnston's Asbestos Co. Specimens showing the mode of occurrence of the mineral were also included.

Chrome Ore and concentrates from Black Lake.

Copper Ore from Eustis Mine, Capelton.

Mica from Templeton.

Magnetic Lands from Moisie, Saguenay County.

Next year teh Quebec exhibit will be much more comprehensive.

NEW BRUNSWICK.

Iron.

Magnetic Iron Ore, Lepreau, Charlotte County. These ores occur in veins, from a quarter of an inch to eight inches in thickness, in schists of pre-Cambrian age, about two miles from the village of Lepreau. They contain 66 per cent. of metallic iron, and are free from titanius.

Magnetic Iron Ore, Deer Island, Charlotte County. The specimen exhibited is from deposits similar in age and character to those of Lepreau.

Magnetic Iron Ore, Nepisiguit River, Gloucester County. The ores of this locality, though long known, have but recently attracted attention. They are found on the left bank of the Nepisiguit River, about eleven miles from the town of Bathurst and seven from the line of the Intercolonial Railway. They occupy an extensive area, and are of good quality. They are the property of the Drummond Mines, Limited.

Hematite, Jacksontown, near Woodstock, Carleton County.

Copper.

Sulphide of Copper, Letete, Charlotte County.

Sulphides of Copper (Bornite, Chalcopyrite and Copper Glance), Simpson's Island, Charlotte County. The occurrence of copper ores on Simpson's and Adam's Island is similar to that of Letete, except for the presence of bornite and copper glance.

Sulphide of Copper (Chalcopyrite), Northampton, 4½ miles from Woodstock, Carleton County. Cobbler and Sexton Mine.

Sulphides of Copper (Bornite and Chalcopyrite), Goose Creek, St. John County. American Copper Co.

Sulphide of Copper (Copper Glance), Dorchester, Westmoreland County. These ores are peculiar as occurring in grey sandstones and conglomerates of carboniferous age, partly in the form of small veins, rarely more than a quarter of an inch in thickness, and partly disseminated through the rock in quantities not directly visible to the eye. There is also more or less of the green carbonate.

Nickel.

Nickeliferous Pyrrhotite, St. Stephen, Charlotte County. The New Brunswick ore is, like that of Sudbury, a pyrrhotite, and occurs in or partly replaces a highly crystalline diorite, probably of pre-Cambrian age.

Antimony.

Sulphide of Antimony (Stibnite), Native Antimony, Lake George, Prince William, York County. Canadian Antimony Co. of Lake George. Quite recently interest in these deposits has been renewed, considerable quantities of ore have been taken out, and the Canadian Antimony Company of Lake George (capital $250,000) is proposing to carry on operations on an extended scale. The average percentage of antimony is 20 per cent., with in some analyses from 1½ to 2 oz. of silver to the ton.

Manganese.

Manganese Oxides (Manganite and Pyrolusite), Markhamville, Kings County.

Manganese Oxides (Manganite and Pyrolusite), Shepody Mountain, Alberta, County; Jordan Mountain, Kings County; Quaco, (St. Martin's), St. John County.

Manganese Oxides (Manganite and Pyrolusite), Tattagouche River, near Bathurst.

Bog Manganese, Dawson Settlement, Albert County. The ores of Markhamville were remarkable for their richness, the best grades ranging as high as 98 per cent. of pure ore, and worth about five cents per pound, while lower grades, shipped without special treatment, brought in England $15 per ton. The ores from the locality were almost entirely used for chemical purposes. The Markhamville mine is said to have produced some of the highest grade manganese in the world.



QUEBEC'S MINERAL EXHIBIT.

At Dawson Settlement, Albert County, occurs a deposit of Wad, or Bog manganese, of remarkable extent and purity, containing by analysis about 45.81 per cent. of metallic manganese. They are therefore low-grade ores as compared with those of Markhamville, but are well suited for the manufacture of spiegel and ferro-manganese, employed in steelmaking.

Coal.

Bituminous Coal, Minto, Queens County, N.B.; Beersville, Kent County, N.B. The coal is of the caking variety, and as such is highly esteemed for black-

smiths' use. When properly screened it is also a good house coal. It is largely used upon the I. C. R., as well as for electric light works, water works and factories. It is worth, in Fredericton, from $3.50 to $4 per ton.

Albertite.

Albertite is closely related to petroleum in its properties, though differing somewhat in chemical composition. When subjected to distillation it yields about 100 gallons of oil to the ton, while the gas product was 14,500 cubic feet of superior illuminating power. It was chiefly employed as an enricher of coal gas, and was valued at from $15 to $20 per ton.

Bituminous Shale.

A considerable band of highly bituminous shales, probably of Devonian age, traverses the counties of Kings, Albert and Westmoreland, and in the vicinity of Baltimore, Albert County, assumes something of the character of cannel coal.

Quite recently renewed attention has been directed to these shales in consequence of the very succesful treatment of similar shale in Scotland, and a considerable shipment from Baltimore has been sent to the latter country under the direction of the Canadian Geological Survey, to test more thoroughly its capacity for similar treatment. The results of this experiment are not yet available in detail, but from reports so far received the prospects are very encouraging.

Petroleum.

Memramcook, Westmorland County. Not only are the bituminous shales of Albert County largely impregnated with oily matter, but at various points fluid petroleum has been found to occur in these and the associated rocks.

Graphite.

St. John. Bands of impure graphite are found, associated with Laurentian limestone, at several points afforded material for foundry facings and the manufacture of paint. They are not, however, at present being utilized. The material contains a little less than 50 per cent. of graphite carbon, but its state of physical aggregation is apparently unsuited for the higher uses to which graphite is often applied.

Gypsum.

Snow White Gypsum or Alabaster, Translucent Gypsum, Pink and Salmon-red Gypsum, Grey Gypsum,



NEW BRUNSWICK'S MINERAL EXHIBIT.

Crystallized Gypsum or Selenite, Fibrous Gypsum, Anhydrite, Hillsboro, Albert County. Albert Manufacturing Company. New Brunswick has long been noted for the extent and character of its gypsum disposits. These always occur in connection with red sediments and limestones of Lower Carboniferous age., and are found at many localities, of which Hillsboro, Albert County, is by far the most important. The plaster beds here cover a large area, and many quarries have been opened, showing faces of from thirty to one hundred feet, but without revealing the base of the deposit. The larger part of the rock is a pure white opaque gypsum of exceedingly fine grain, but with this are to be found in places all the varieties enumerated above. Anhydrite, or "hard plaster," is irregularly

distributed through or with the softer gypsum, but large bodies free from such admixture are met with. Selenite or crystallized gypsum is of rare occurrence. The analysis of the Hillsboro plaster shows 98.88 of pure gysum.

The United States duty on manufactured plaster is $2.25 per ton, and were it not for the superior quality of the Hillsboro rock, would be well nigh prohibitive.

Gypsum, Plaster Rock, Victoria County. On the Tobique River, in Victoria County, are large beds of gypsum, which have for many years been used for fertilizing purposes by the farmers of Carleton County and Aroostook County, Maine.

Building Stones.

Grey Granite, Spoon Island, St. John River, Hampstead, Queens County.

Red Granite, St. George, Charlotte County.

Black Granite (Mica-diorite), Bocabec, Charlotte County. Granite is a very abundant rock in New Brunswick, occupying large areas, and presenting several varieties.

Freestones.

Freestones, Dorchester (Budreau quarries).

Grey Freestone, Chatham (French-fort quarries).

Red Freestone, Sackville (Sackville Freestone Co., Ltd.).

Ornamental Stones.

Feldspar Porphyry, Chamcook Lake, Charlotte County.

Marble and Serpentines, St. John, N.B.

ALBERTA.

The general exhibit of the Province of Alberta, whose fuel supply is now a large factor in the industrial development of the West, was handled by Mr. Richardson, the Director of the Alberta Provincial Exhibition. Wheat and coal, the two staples of the province made up most of this admirably arranged exhibit. Bituminous coals, lignites, anthracites, coke and briquettes surrounded the field of wheat. The coal specimens were of surprising size and purity. The Briquettes from Bankhead, Alberta, served as a gentle reminder that Alberta is keeping pace with the best in the conservation of her natural resources.

Drummond Mines, Limited.—Prominent among the mineral exhibits were two large pyramids of iron ore from this company's extensive deposits at Bathurst, N.B., and at Torbrook, N.S.

The Bathurst ore, a high-grade magnetite, as shipped, contained 60 per cent. iron and low phosphorous and sulphur. The Torbrook ore, ranging from 52 to 58 per cent. iron, contains about one per cent. phosphorus. These exhibits represent two of the most important iron ore deposits of Eastern Canada. Both are situated near tidewater. They will form the basis of large industries. In both localities the visible supply is enormous.

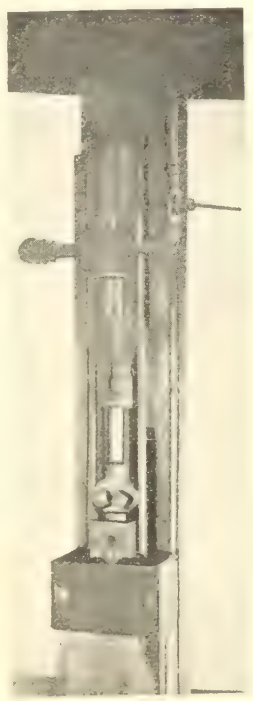
A USEFUL DEVICE.

By Fred Cotton, Sulphide, Ontario.

The accompanying cut illustrates a useful air-hammer for making drill shanks for rock-drills. The whole apparatus is simple and inexpensive.

Before hitting upon this idea I was turning shanks on the lathe. This took up so much time that this simpler method occurred to me.

I took an old drill cylinder that was of no other use on account of the feed not long having broken off; also a C. I. block 12″ x 12″ x 14″, and put the side rods through the block, leaving a shoulder on the rods between the cylinder and block. Cast steel dies, one half fastened to block, the other made with drill shank to fasten to chuck, completed the outfit.



HOME MADE SHANK MACHINE.

I also removed ratchet and rifle bar, filled the piston with babbit, slotting out the chuck to fit side rods and keep dies in position. This also acted as crosshead.

This hammer is set up on a 12″ x 14″ timber, cemented to the ground. It has been working all summer to perfection, and makes a good drill-shank in less than one minute.

Steel bands or belts, as a substitute for ordinary leather belts or rope drives, have been introduced by a factory of Charlotteburg, Germany. Such belts may be reduced to about one-sixth of the size required for leather belts, they do not stretch, pulleys may be made narrower, and in some cases may be smaller. Either ordinary pulleys or pulleys with a special covering to increase friction may be used. A belt 4 inches wide and 1-5 inch thick transmitted 200 to 250 horse-power at a belt-speed of 5,400 feet per minute, and tests have shown that steel belts may run 12,000 feet per minute.

The smoke-density meter of Edmund J. Kunze comprises a short length of one-inch brass tube, to one end of which is pivoted a revolving disc of transparent celluloid in four sections. These sections are tinted different shades of gray to correspond to densities between no smoke and jet black, and each has a hole in the centre. The observer, looking toward the smoke, turns the disc until the tint nearest the smoke is found.

THE CANADIAN EXHIBIT AT THE FRANCO-BRITISH EXHIBITION.

As a contrast to the mineral exhibits of the Provinces at the Canadian National Exhibition, we give herewith three views of Canadian exhibits at the Franco-British.

Plate No. 1 illustrates the Manufacturers' Exhibit. In an alcove to the left of the exit may be seen a display of coal, iron ore, etc., and steel rails from the Algoma Steel Company.

Plate No. 2 represents the agricultural section. Engines from E. Leonard & Sons and from Fairbanks, Morse & Co. are shown. Plate No. 3 shows the mineral section. Fifty-one cases, similar to those seen in the photo, were used to display these exhibits.

In the left foreground is seen a pyramid of building stones, slate, brick, cement, etc.; in the centre fore-

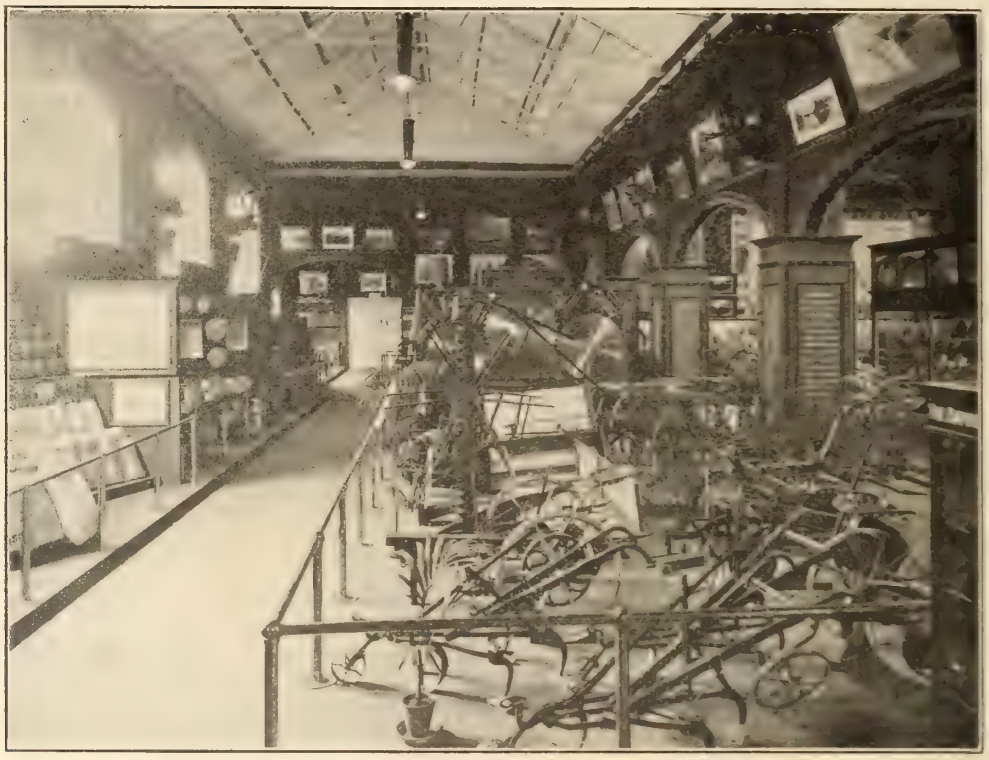


PLATE 1.—MANUFACTURERS' EXHIBIT. COAL, IRON ORE, AND ALGOMA RAILS IN ALCOVE TO LEFT OF EXIT



PLATE 2.—CANADIAN ENGINES, ETC.



PLATE 3.—MINERAL SECTION.

ground a pyramid of silver-lead ores and silver-zinc ores from British Columbia.

In the central large case the Mond Nickel Company displays nickel-copper ore and products. There are also here cobalt-nickel and silver ores, mica, pyrite, and a large exhibit from the Canadian Copper Co. Apatite, corundum, talc, and asbestos are also included.

Thirty transparent photographs of mining plants embellish to crown of the large case.

QUARTZ AND FELDSPAR.

By Edson S. Bastin.

From Advance Chapter Mineral Resources of the United States.

QUARTZ.

Introduction.

Quartz, the most abundant of all minerals, occurs in a great variety of forms and is utilized commercially in many different ways. Certain transparent colored varieties, such as rose and smoky quartz and amethystine quartz, have a gem value and are discussed in the chapter on precious stones. Sand used for building, molding, and in glass and pottery manufacture, is also discussed in other parts of this volume, as are tripoli and sandstone and quartzite used for building purposes, and quartz used as an abrasive, although all these materials are nearly pure quartz. This chapter deals only with massive crystalline quartz (often called vein quartz), with flint, and with quartzite which is used for other than building or paving purposes.

Massive Crystalline Quartz.

Quartz of this variety is usually white, though occasionally rose colored or smoky. It occurs in vein or dikelike masses, unmixed with other minerals, or as a constituent of pegmatite. In the latter occurrence it is produced as an accessory in the mining of feldspar. The States now producing massive crystalline (vein) quartz in commercial quantity are Connecticut, Illinois, Maryland, New York, and Pennsylvania. Small quantities were formerly marketed from Maine, but these quarries are so far from the principal markets that the quartz can not now be sold at a profit.

Quartzite.

This rock may be described as a sandstone in which the spaces between the quartz grains have been completely or almost completely filled, either through a further deposition of quartz between the grains or through a recrystallization of the quartz of the original grains. The result is a solid mass of quartz. In Cherokee County, N.C., a hard, vitreous quartzite of Cambrian age is extensively quaried for use as a flux in copper smelting.

Flint.

The name flint is properly applied only to quartz of exceedingly compact texture, dull surface, and perfectly conchoidal, splintery fracture. It commonly occurs in the form of more or less irregular nodules in limestones. Chert is another name applied to flint occurring in this way. Flint or chert nodules occur abundantly at several localities in the United States, notably in the Cretaceous limestones of central Texas, a locality in the west portion of the city of Austin being the most accessible. So far

as known very little domestic flint has ever been commercially utilized except as road material, though its quality appears to be equal to that of the imported flint. All the true flint consumed in this country comes from France, Greenland, Norway, and England, and is imported cheaply as ballast. Many of the smaller and nearly spherical nodules are used in tube mills, but much of the material is fired in kilns and then ground for use in the pottery trade. The flints, which are usually gray to nearly black in their natural condition, become perfectly white on burning and fracture somewhat, so that grinding is facilitated.

Methods of Grinding.

In the grinding of the massive forms of quartz two general processes are used, which may be called the "wet process" and the "dry process."

In the wet process the quartz may be crushed just as it comes from the quarry, or it may first be highly heated in kilns and then fractured by turning upon it a stream of cold water. The first crushing is effected by jaw crushers or if the quartz has previously been burned it may be crushed in chaser mills. In a few mills the chasers revolve in wet pans and are periodically stopped to allow the crushed quartz to be shoveled out. After crushing, it is ground in "wet pans" provided with a pavement of flat-faced quartz or quartzite blocks over which move several large blocks of similar material, the crushed quartz being pulverized between these blocks and the pavement. The grinding in wet pans usually occupies about twenty-four hours, the load ground in a single pan varying from 1,200 to 1,800 pounds. From the wet pans the paste-like mass of quartz and water is drawn into settling troughs, the first settlings being in some cases returned to the pans for finer grinding. From the settling troughs it is shoveled out upon drying floors heated by steam or hot air or else is dried in small pans which are placed tier on tier on heated racks constructed of steam pipes. Finally the dried material is bolted to various degrees of fineness and packed in bags for shipment, or it may be shipped in bulk.

In the dry method of treatment the quartz is usually crushed first in a jaw crusher and then between steel rollers, though in some cases it goes from the jaw crushers to a gyrating crusher before passing to the rolls. Quartz to be used for filters and for abrasive purposes is then screened to various degrees of fineness, usually through revolving screens, and is packed in bags for shipment. In the manufacture of the finer grades for use in pottery, wood fillers, scouring soaps, etc., the material after leaving the roll crushers is ground in tube mills, either of the continuous or of the intermittent type. It is then graded to various sizes either by bolting or by a pneumatic process whereby the quartz powder is carried by a strong air current through a series of tubes and receptacles, the distance to which the quartz is carried being dependent on its fineness.

Uses.

Quartz of the kinds dealt with in this report is used for a great variety of purposes, the principal uses being in the manufacture of wood filler, pottery, paints, and scouring soaps. In pottery the quartz serves to diminish shrinkage in the body of the ware and is used also in many glazes. Quartz for these purposes should be nearly free from iron-bearing minerals. In general the analysis should show less than one-half of 1 per cent. of iron oxide. Finely ground quartz is used in paints in various proportions up to one-third of the total pigment used. Its chemical inertness prevents it from combining with other constituents of the paint and increases the resistance of the paint to the weather. Crystalline quartz is superior to silica sand for this purpose because the ground particles are highly angular and tend to attach themselves more firmly to the painted surfaces, thus giving the paint what is known as a "tooth" and after some wear affording a good surface for repainting. This angularity of the grains also renders the ground crystalline quartz superior to silica sand in the manufacture of wood fillers. In scouring soaps and polishers ground crystalline quartz is preferred to silica sand, not only because of its greater angularity, but because of its superior whiteness.

Massive quartz, crushed and graded to various degrees of fineness, is extensively used in the manufacture of sandpaper, sand belts, as a scouring agent with sand-blast apparatus, etc. The qualities which render it particularly serviceable for these purposes are its hardness (No. 7 in the Mohs scale), which is slightly greater than that of steel, and its conchoidal fracture, the absence of definite cleavage planes causing it to crush to fragments with sharp, angular edges and corners. For such abrasive purposes massive quartz is far superior to sand or crushed sandstone, since the grains of the latter are likely to be more or less rounded. Blocks of massive quartz and quartzite are used in the chemical industry as a filler for acid towers and to some extent as a flux in copper smelting. Much ground quartz is used in filters, and some of the most finely pulverized grades are used in tooth powders and in place of pumice as a cleaner by dentists.

Within recent years crystalline quartz and also sand has been used to some extent in the manufacture of silicon and ferrosilicon by electrolytic processes, much of the output being produced at Niagara Falls. The metal silicon, which is a crystalline metallic substance of bright silver luster, has a specific gravity of about 2.49 and a melting point of about 1,430° C. Various grades are produced, running from 90 to 98 per cent. silicon, the purity depending for the most part on the purity of the crude materials used. It can readily be cast into rods, and because of its high electrical resistance, which is about five times that of carbon, it is used in the manufacture of rheostats and electrical heaters. Silicon and ferrosilicon are extensively used as a hardener in steel manufacture and in the manufacture of alloys for copper and bronzes. Another important use of metallic silicon promises to be in the manufacture of chemical ware, its resistance to nearly all acids, combined with the fact that it can be cast in molds, making it suitable for these purposes. Chemical ware made of fused quartz has been on the market for some time, most of it being of European make. These wares are usually white and semi-transparent. They soften only about 1,400° C (2,552° F.) and show great resistance to sudden changes of temperature, the coefficient of expansion being extremely small. The principal drawback to the use of these wares, especially in quantitative chemical work, is that the somewhat rough character of their surfaces makes it difficult to wash thoroughly all material from the dishes.

Mode of Occurrence of Feldspar.

The feldspars are among the most widely distributed minerals and occur as constituents of nearly all rocks. In these occurrences, however, the feldspar is usually in too small grains and too intimately associated with other minerals to be of commercial importance. Com-

mercial feldspar usually occurs as a constituent of pegmatites. These are rocks of extreme coarseness and irregularity of texture. In mineral composition they may vary greatly, but those of present commercial importance belong chiefly to two types—(1) the granite pegmatites, which are essentially giant granites, their minerals being the same as those most abundant in ordinary granites, namely, quartz, potash-feldspar, muscovite, biotite, tourmaline, etc.; and (2) the soda pegmatites, which contain no quartz, no tourmaline, and little or no mica, but consist mainly of the soda feldspar, albite, with small quantities of hornblende. By far the larger number of the feldspar quarries of the United States are in deposits of granite pegmatite; only a few in southeastern Pennsylvania and adjacent parts of Maryland belong to the soda pegmatite type.

Pegmatites occur in or near most areas of crystalline rocks, usually as dikelike masses, following whatever planes of foliation or easy fracture may be present in the surrounding rocks, though in some cases cutting across these and often forming irregular bodies of considerable size. Different pegmatite masses even in the same region often differ considerably in coarseness, and even a single mass may vary greatly in coarseness from point to point. In general only a small part of the pegmatitic material of a region is sufficiently coarse grained or sufficiently free from iron-bearing minerals to be of commercial value. The geologic evidence generally supports the view that the pegmatite is really but one type of igneous intrusion, the molten rock magma being characterized by the presence of large quantities of gases or water vapor, which facilitated the formation of large crystals. The relative proportions and the quality of the different pegmatite constituents vary in different deposits, some being valuable chiefly for their mica, others for their quartz, and others for their feldspar. In some, two or all three of these minerals can be exploited. In a few cases the pegmatite is exploited principally for its gem minerals and its compounds of the rare metals.

The feldspar may occur as large crystals, occasionally 15 to 20 feet across, unmixed with other constituents, or they may be intergrown with quartz or with other minerals. The intergrowth with quartz is in some cases irregular, but in other cases it consists of crystals of quartz and feldspar, from several inches to several feet across, which penetrate one another in such a manner that on certain cleavage faces of the feldspar the quartz forms peculiar patterns somewhat resembling the cuneiform inscriptions on ancient monuments. To such intergrowths the name "graphic" granite has been given, from the Greek verb *graphein*, to write. Analyses of many specimens of graphic granite have shown that it is characterized by a very nearly constant proportion between the quartz and the feldspar, the feldspar forming from 70 to 80 per cent. of the rock and the quartz from 20 to 30 per cent. Two specimens of a graphic intergrowth of potash feldspar and quartz analyzed in the laboratory of the United States Geological Survey showed, respectively, 72.9 and 73.7 per cent. of feldspar, with 27.1 and 26.3 per cent. of quartz, although one specimen was approximately four times as coarse as the other. A graphic intergrowth of potash feldspar and quartz from Elfkarleo, in Sweden, which was so fine grained that the graphic structure could be seen only under the microscope, showed upon analysis about 79.2 per cent. of feldspar and 20.8 per cent. of quartz.

The finer-grained types of graphic granite are utilized commercially in some districts, as, for example, in southeastern Pennsylvania; but among many feldspar miners the opinion prevails that the finer-grained varieties contain so much quartz as to render them commercially valueless. This opinion probably has its origin in their somewhat deceptive appearance, the fineness of grain causing them to appear richer in quartz than is actually the case. From the evidence furnished by analyses it would seem clear that from the commercial standpoint at least the proportion between quartz and feldspar in graphic granites of all textures may be regarded as nearly constant, so that the finer-grained types are as valuable commercially as the coarse. Graphic textures are not observed in any of the soda pegmatites.

Methods of Mining.

The methods of feldspar mining are very simple. The excavations are nearly always open pits, usually of rather irregular form, the valueless portions of the pegmatite being avoided wherever possible in the mining work. In a few Pennsylvania quarries where the pegmatite masses are rather flat-lying and are overlain by a roof of worthless rock short tunnels have been driven from the open pits.

In Maine, Connecticut, and New York the pegmatite is usually firm and undecomposed, even in the surface outcrops, and it is necessary to sink drill holes and to blast out most of the material. In Pennsylvania and Maryland, however, the pegmatite is in most cases much decayed at the surface and the materials can frequently be excavated with the aid only of picks, shovels, and crowbars. In a few of these quarries kaolin produced by the decay of the feldspar has been found in the past in sufficient quantities to be of commercial importance, though none is now produced. This difference in the character of the pegmatite deposits in the two regions is due to the fact that the Pennsylvania-Maryland region is unglaciated, while in the more northerly region glacial ice planed off most of the products of rock decay.

In the smaller quarries where the rock is firm the drilling is usually done by hand, but in most of the larger quarries steam drills are used. The large masses are then broken with sledges into pieces about 6 inches in diameter, the more micaceous and quartzose parts and the portions carrying iron-bearing minerals being at the same time sorted out and discarded. In most of the Pennsylvania and Maryland quarries where the weathered materials near the surface can be excavated with the aid only of the pick and shovel, screening and sometimes washing is often necessary to separate the dirt from the spar. In some of the larger and deeper quarries derricks and drags are used in hoisting the spar to the surface, the material being then loaded into wagons and hauled either to the railroad for shipment or to the mills for grinding. In some quarries the wagons descend into the pit along an inclined roadway.

Commercial Availability of Deposits.

The question whether it will pay to work a given feldspar deposit depends upon a number of different factors, chief among which are (1) distance from the principal markets, (2) distance from the railroad, (3) quality and quantity of the material, (4) market conditions, and (5) ease of working. Favorable conditions with respect to some of these factors may counterbalance unfavorable conditions with respect to others. The deposits of Connecticut, New York, Pennsylvania, and Maryland are worked at a considerable advantage when compared with those of Maine, being much nearer the principal markets. Because of this advantage, hauls by team of 6 or 8 miles

from the mines to the railroad are permissible in certain of the more southerly districts, while under present conditions in Maine a deposit to be worked profitably must usually be within 3 miles of a railroad or of navigable water.

The requirements of the potter's trade demand that in general the percentage of free quartz associated with the feldspar shall not exceed 20 per cent. in the ground product, and certain potters demand a spar which is nearly pure, containing probably less than 5 per cent. of free quartz. In order to be profitably worked, in most feldspar mines between one-fourth and one-half of the total material which must be excavated should contain less than 20 per cent. of free quartz.

A factor of the utmost importance is the quantity of iron-bearing minerals, black mica, hornblende, garnet, or black tourmaline, which is present and the manner in which these minerals are associated with the feldspar. The requirements of the pottery trade demand that the spar be nearly free from these minerals, which if present produce brown discolorations in white wares. In order that a deposit may be worked profitably these minerals if present in any appreciable quantity must be so segregated in certain portions of the deposit that they can be separated from the spar without much more hand sorting and cobbing than is necessary in the separation of the highly feldspathic material from that which is highly quartzose or rich in muscovite. A number of pegmatite deposits of coarse grain are rendered worthless for pottery purposes by the abundance of one or more of these iron-bearing minerals. The presence here and there of minute flakes of white mica (muscovite) is characteristic even of the highest grades of commercial feldspar, and chemically this mineral is not injurious. It is, however, exceeedingly difficult to pulverize the thin, flexible mica plates to a fineness equal to that attained by the feldspar, and it is therefore necessary in mining to separate carefully as much of the muscovite as possible from the spar.

Methods of Grinding.

The methods used for grinding feldspar are similar in a general way in all of the Eastern States and are very simple. The soda spar quarried in southeastern Pennsylvania is first burned in kilns, which serves to fracture it and thus facilitate grinding. Most feldspar, however, is fed just as it comes from the quarry into a chaser mill consisting of two buhrstone wheels about 3 to 5 feet in diameter and from 1 to 1½ feet thick, attached to each other by a horizontal axle, as are the wheels of a cart. The horizontal axle is attached at its center to a rotating vertical shaft, which causes the buhrstone wheels to travel over a buhrstone bed, the feldspar being crushed between the wheels and the bed. In a few mills the spar before going to the chaser mills is crushed in a jaw crusher.

The material as it comes from the chasers is screened, the tailings being returned to the chaser mills for recrushing, while the fines go to tube mills for their final grinding. The tube mills consist of steel cylinders revolving on a horizontal axis. They are usually lined either with hard-wood blocks or with blocks made of natural or artificial siliceous brick, and are charged with Norway or French flint pebbles 2 to 3 inches across. Feldspar for pottery purposes is usually ground for from four to six hours, and in that time is reduced to a fineness of at least 200 mesh. Some of the poorer grades of feldspar used in glass manufacture are ground only for from two to three hours, great fineness not being required in such material. Feldspar for use in abrasive soaps is sometimes ground for as much as ten hours. The type of tube mill used by most feldspar grinders is about 6 feet in length, and it grinds from 2 to 3 tons of spar at one charging. Certain millers' however, claim to effect a considerable saving in power by the use of larger mills, which grind from 4 to 6 tons at one charge. After grinding, the spar is ready for shipment either in bulk or in bags. The red spars from Bedford, N.Y., and Bedford, Ontario, have a faint pinkish tint when ground, but the cream-colored and white spars grind to a pure white. In a few mills the ground spar is allowed to settle slowly in water, so as to separate the finer from the coarser material, but this method is now rarely employed. Two hundred mesh to the inch is the figure usually given as the fineness required by pottery manufacturers, and it is probable that most of the material placed on the market comes within this limit.

In a new mill of large capacity recently erected near Middletown, Conn., the feldspar is crushed first in a gyratory crusher and then between steel rolls. It then goes to a rotary dryer and to aerial jig screens designed to free the material from mica flakes and iron-bearing minerals. After this it is ground in continuous-feed tube mills.

Uses.

The principal consumers of feldspar are the pottery and enameled brick and electrical ware manufacturers, its main application being as a constituent part of both body and glaze in true porcelain, white ware, and vitrified sanitary ware, and as a constituent of the slip (underglaze) and glaze in so-called "porcelain" sanitary wares and enameled brick. The proportion of feldspar in the body of vitrified wares usually falls between 10 and 35 per cent., though sometimes less and sometimes more. Its melting point being lower than that of the other constituents, it serves as a flux to bind the particles together. In glazes the percentage of feldspar usually lies between 30 and 50. The trade demands that feldspar for pottery purposes be nearly free from iron-bearing minerals (biotite, garnet, horneblende, tourmaline, etc.) and contain little if any muscovite. In regard to the percentage of free quartz, the requirements vary with different potters. A few manufacturers of the finer grades of pottery demand less than 5 per cent. of free quartz, and may even grind the spar themselves so as to be sure of its quality, preferring to insure a constant product even at higher cost by themselves mixing the requisite quantity of quartz with the spar. Most potters get satisfactory results with "Standard" ground spar carrying 15 to 20 per cent. of free quartz, and in some cases the percentage runs even higher. In the finely ground mixture as it comes from the mills it is difficult to separate the quartz from the feldspar by physical methods on account of the extreme fineness of the material. Chemical analysis seems to be the readiest means of determining whether its percentage is high or low.

Feldspar is also used in emery and carborundum wheel manufacture as a flux to bind the abrading particles together.

Small quantities of feldspar are used in the manufacture of opalescent glass. The feldspar used for this purpose is ranked as No. 3 by the miners; it usually contains more free quartz and muscovite than that used for pottery purposes, and in most cases also contains fragments of iron-bearing minerals. Most of the spars known to the writer which are used for opalescent glass are notably richer in soda than in potash. They are usually ground only to a fineness of 50 to 60 mesh.

Small quantities of carefully selected pure feldspar are used in the manufacture of artificial teeth. Some is used in the manufacture of scouring soaps and window washes, the fact that feldspar is slightly softer than glass rendering these soaps less liable to scratch windows or glassware than are the soaps in which quartz is the abrasive substance. One firm in New York State crushes pegmatite for poultry grit and for a covering for concrete and tarred surfaces to give the appearance of granite.

Much interest has recently been aroused in the use of potash feldspar for fertilizing purposes. Potash is an important plant food, which, in fertilizers, has usually been applied in the form of wood ashes or of easily soluble potash salts (sulphate, carbonate, or chloride) imported from Germany. The Department of Agriculture has recently conducted preliminary experiments to determine the availability of finely ground potash feldspar as a substitute for the more soluble potash salts. The following statement is quoted from the report on these tests:

> The evidence so far obtained appears to indicate that under certain conditions and with certain crops feldspar can be made useful if it is ground sufficiently fine. On the other hand, it is highly probable that under other conditions the addition of ground feldspar to the land would be a useless waste of money. At the present stage of the investigation it would be extremely unwise for anyone to attempt to use ground rock, except on an experimental scale that would not entail great financial loss.

If further experimentation shows that ground feldspar has a wide efficiency as a fertilizer, it will undoubtedly lead to the utilization of many of the pegmatite deposits which, because of insufficient coarseness, too large a percentage of quartz, or too great an abundance of iron-bearing minerals, are not valuable as a source of pottery material. Deposits of this kind, favorably situated with respect to the railroads, are numerous, especially in the vicinity of the active feldspar quarries. An equally important result will be the utilization of much of the material which is discarded at the present feldspar quarries.

A number of processes have been patented in this country for the dissociation of potash feldspar to obtain the more readily soluble potash salts, but none of these have as yet been successfully applied on a commercial scale. What is perhaps the most promising method effects the decomposition through electrolytic methods.

EXCHANGES.

The Mining and Scientific Press—August 29, 1908.

The editor of the *Mining and Scientific Press*, Mr. T. A. Rickard, has completed a tour of inspection through the Yukon dredging region. To the current issue of the Press he contributes the first of a series of articles, in which it is his evident intention to clear away misapprehensions. Mr. Rickard's statements do not support those made in the columns of the *Engineering and Mining Journal* of New York. To some of the latter the CANADIAN MINING JOURNAL had occasion to take exception.

The Mexican Mining Journal—September, 1908.

The *Mexican Mining Journal* asserts that the outlook is favorable for satisfactory mining legislation. "It cannot be denied," remarks our bright contemporary, "that great harm has been done the country by the mere proposing of a restrictive policy on foreign very much the benefit of the new capital, both for private enterprises and to sustain the public revenues. In fact, this very need, which is becoming more evident daily, in public and private affairs, is a strong assurance that the restrictive features of the proposed law will not be enacted."

The Engineering and Mining Journal—Sept. 5, 1908.

Percy E. Barbour has an article in this number on the Goldfield Consolidated 600-ton mill. This large mill will commence treating ore during the latter part of this year. It embodies the last word in modern mill design and equipment. The ore will be crushed by stamps and tube mills, concentrated on Deister tables, and the pulp will be acynided in Pachuea agitation tanks. We can here notice but a few of the features of the plant. A Vezin N. 3 sampler, handling 2-inch material and taking a 5 per cent. or 10 per cent. cut. The mill building is entirely of steel construction. The roof and side material is asbestos-protected corrugated metal. The foundations of the mill building alone contain 7,000 cubic yards of concrete. The mortar block is entirely of concrete.

The Mining World—September 5, 1908.

Mr. Alex. Gray, late of the South African Journal, now of Montreal, writes in this number of the property and plant of the Right of Way Mine, Cobalt. The physical condition of the mine is outlined, and Superintendent Houston's methods are critically and favorably commented upon. Referring to the original agreement under which the property was acquired by its present owners, Mr. Gray remarks that, hopeless as the bargain seemed at first, "one carload extracted from a surface cutting on the Right of Way, about 500 feet from the La Rose shaft, . . . reimbursed the Ottawa promoters of the project and gave impetus to an enterprise . . . that has paid to June, 1908, 20.99 per cent in dividends.

The South African Mining Journal—August 8, 1908.

This number of our contemporary contains an editorial on "The Problem of Drill Steel." Having discussed the matter with a visiting American mining engineer, the *S. A. Mining Journal* supports his contention, that inferior drill steels are in use on the Rand. It is stated that this conclusion could have been reached independently by watching the results of the stope-drill contest. "Many thousand pounds a year" could be saved "by the use of better steel, and the improved tempering of steel." Five out of the nine machines that competed experienced trouble with their drill steels. If, under special conditions, this was the case, how much more loss and trouble must there be in working the year round?

PERSONAL AND GENERAL.

Dr. Milton L. Hersey, Montreal, has given $10,000 to endow a fellowship in the Chemistry Department of the Kingston School of Mining.

Mr. T. A. Rickard, of the Mining and Scientific Press, San Francisco, recently made a trip to the Yukon and Alaska in the interests of his journal.

President J. H. Plummer, of the Dominion Iron and Steel Company, has purchased a $50,000 mansion in Rosedale, Toronto, to which he will shortly remove.

We regret to announce the death of Mr. George G. Blackwell, the senior and founder of the firm of George G. Blackwell, Sons & Co., Limited, Liverpool, England. Mr. Blackwell's death took place at Waterloo on August 26th.

Mr. A. A. Hassan, mining engineer, has returned from a professional tour of Mexico and California. After visiting the Right of Way and Victoria mines in Cobalt, Mr. Hassan will proceed to Larder Lake, where he will examine several properties. Mr. Hassan's headquarters for the present will be the Victoria mine, Cobalt.

CORRESPONDENCE.

Editor's Note.—The following letter we are glad to reproduce. To gather the opinions of men in the field is exactly our object. So far we have received many letters, not for publication, some of which have been merely personal complaints or expressions of individual animosities. Such communications do not lend themselves to use in the CANADIAN MINING JOURNAL. Whilst it is our clear duty to help in every way to remove difficulties, only harm results from undue bitterness. But the letter printed hereunder contains a practical suggestion, and comes from a man actually in the "bush":

NEW LISKEARD, Sept. 7, 1908.

The Editor of the Canadian Mining Journal.

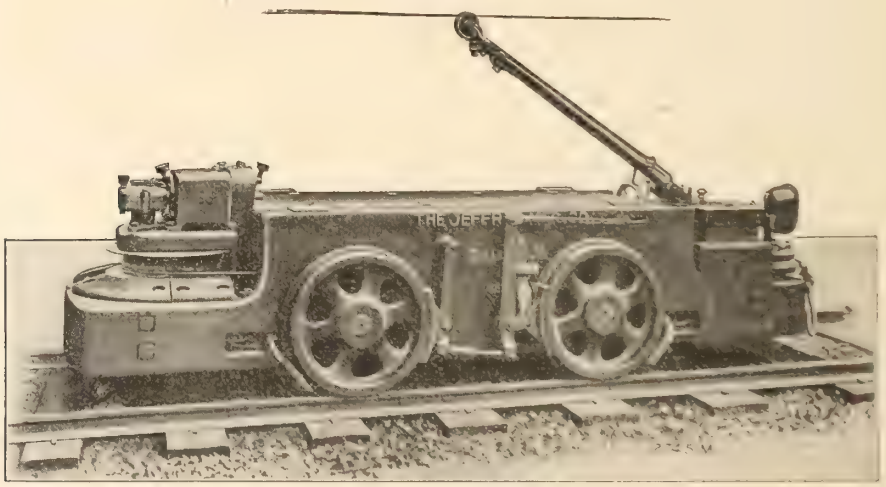
SIR;—I have been reading up my arrears of the MINING JOURNAL, and I find several things that as a prospector interest me. You ask the man from way-back his opinion as to "Discovery before Location." The Mines Act say (if there is no order-in-council lately changing it) that a license-holder can stake out and record three mineral claims in any mining division in Ontario, and he can also stake and record on as many licenses as other people will supply him with, and the result is that the District of Nipissing is staked out with thousands of claims that have never been prospected, and the syndicate of lawyers, doctors and storekeepers who furnished the licenses, recording fees and grub stakes are lighter in pocket and sore on the mining business, or else they form a wildcat stock company and soak their neighbors. If we are to have "Discovery before Location" there must be more prospecting and less staking.

I would suggest that a license-holder be not allowed to stake on the license of anyone but himself three claims and no more, and I think you will agree with me that if a prespector gets one claim in a season that is worth developing he is doing well.

Yours truly,

License-holder 1575. THOS. S. TAYLOR.

INDUSTRIAL PAGE.



THE JEFFREY CRAB LOCOMOTIVE.

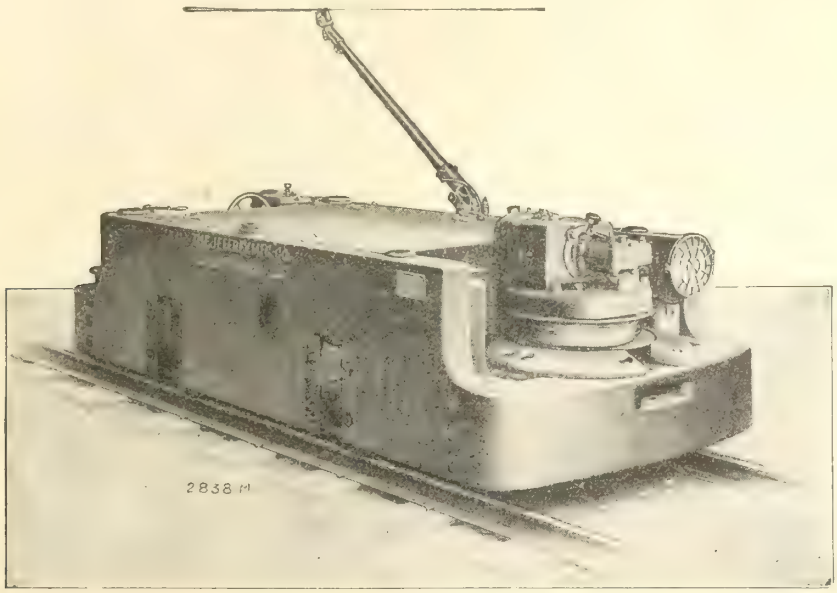
The Jeffrey Manufacturing Company, of Columbus, Ohio, has recently added to its line of electric mine locomotives, a new type of gatherer, known as the Jeffrey Crab Locomotive. The gathering locomotive commonly used is provided with a reel of flexible insulated conductor, which enables it to enter the rooms for the purpose of delivering empty mine cars to the working places, and for hauling out the loaded cars. When the rooms are driven to the dip on steep grades, however, it is difficult for a locomotive which has to enter the room, to work efficiently against the grade. Again, where the tracks are practically level and the cars are not heavy, it is found economical to push the empty into the room by hand, so that mechanical means are required only for hauling out the loaded cars.

The advantages of employing, in such cases, a locomotive capable of pulling out the loaded cars without entering the rooms has prompted the Jeffrey Mfg. Co

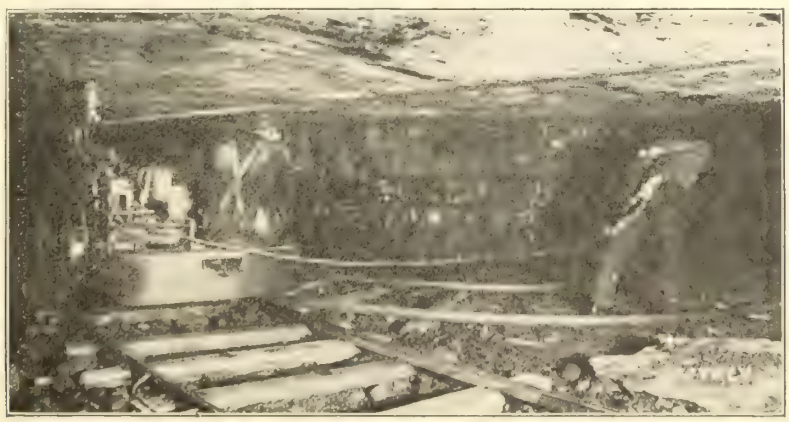
to bring out this crab locomotive, so named from a small winding drum, or crab, which is mounted on the forward end of the locomotive; 350 feet of ⅜-inch flexible wire cable wound on this crab is used for pulling the loaded cars from the rooms and out onto the entry tracks.

There are several methods of operating this locomotive to advantage, the choice depending upon the system of mining followed where the locomotive is used. With the double entry system, the locomotive usually hauls a trip of empty cars into one entry and drops them off at the rooms where they are required. Returning on the other entry, it stops in front of each room where a loaded car is ready. The trip rider then drags the cable into the room, attaches it to the car and signals the motorman, who starts the crab motor and pulls the car out to the entry track. The locomotive then either pulls it to the next room or leaves it standing until as many cars have been drawn from the rooms as are required to make up a trip. Then it pushes them together, they are coupled up, and hauled to the partings. On the return trip the entry cars are distributed in the entry from which the loads have just been removed, and the locomotive gathers the loaded cars from the entry which was supplied with empties on the preceding trip.

Where the single entry system is employed, the locomotive usually runs in with a train of empties. Stopping successively in front of the rooms in which loaded cars are ready, it hauls each car to the entry track and pushes it ahead to the next room, dropping off an empty to replace each loaded car taken out. When all empties have been distributed, it then proceeds to the parting with the loads gathered. By each of these methods a locomotive can gather from 75 to 200 cars per day, depending upon local conditions.



The crab device is made as compact as possible, to avoid crowding the rest of the locomotive equipment. It consists of a cast-iron drum, upon which a steel cable is wound. This is mounted on a vertical axis, and is contained in a frame, the top of which supports the motor, which is connected by suitable gearing and a friction clutch to the drum. The motor drives this gearing through a worm and worm-wheel, so that when it stops, the gearing is locked against further motion. The drum is driven by the gearing through a friction clutch, which acts not only as a smooth starting device for the cars, but also as a safety device in case a car becomes derailed or the motorman fails to throw off power until the car bumpers strike those of the locomotive. Without this friction arrangement the cable would, in such cases, break, or serious injury would result to the gearing or to the motor itself.

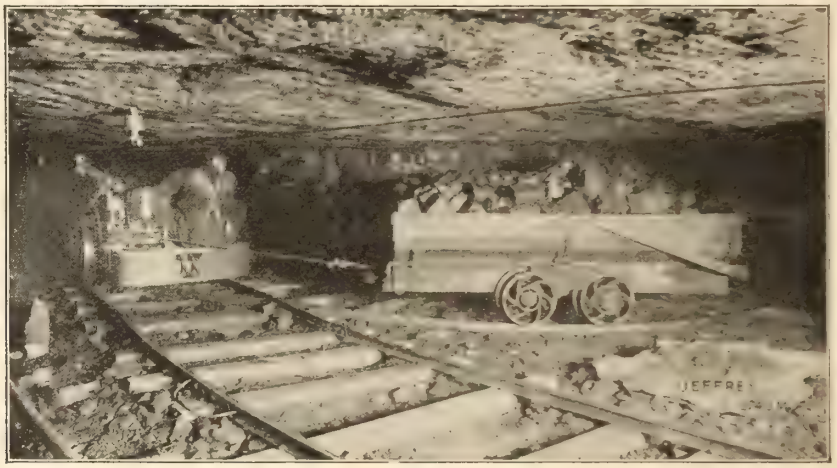


The motor that actuates the crab, being entirely

separate from the locomotive motors, is controlled by a separate starting box, and when the car approaches the entry tracks the motorman starts the locomotive ahead. As it advances past the switch points the car follows and runs out upon the entry tracks without either the locomotive or the winding of the crab being stopped.

The crab may be stopped when the car stirkes the locomotive, but the locomotive need not stop until the room is reached from which the next load is to be hauled. Then the trip rider uncouples the cable and drags it into that room for the car. The arrangement is such that the cable may be paid out from either end of the locomotive. Ordinarily, however, it is more convenient to take the cable out past the motorman, as that end of the locomotive is then opposite the room mouth, and the motorman can watch the light carried by the trip rider, and can see him signal to start winding. He can also watch the car to better advantage, as it takes the switch, and can stop instantly if it should become derailed.

One great advantage claimed for the crab locomotive is that, except where there are rooms driven to the rise at so great a pitch that the cars cannot be pushed into them by hand, it may replace animal haulage at once without making any changes in the tracks or conditions in the rooms.



When the rooms are driven to the rise and it is necessary for the locomotives to enter them in order to push the empty cars to the working places, a gathering locomotive, many types of which are made by the same company, is necessary, as ordinarily it is impracticable to use the crab device for hauling cars into rooms.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay—September 3.

The visit of the representatives of the Institution of Mining Engineers (England) who were invited over to Canada by the Canadian Mining Institute is, so far as Cape Breton is concerned, a thing of the past. The visitors were cosmopolitan, including three German gentlemen and one Belgian engineer. Scotsmen predominated largely in the British representatives, and these gentlemen were naturally quite at home in Cape Breton, which had more aptly been named "New Hebrides" than the islands to which this name has been actually given. Accompanied by a host of gentlemen more or less intimately connected with the coal trade, and by the Governor and Premier of Nova Scotia, the visitors on the 26th inspected, or rather attempted to inspect, the mines of the Dominion Coal Company. They made a hurculean attempt, visiting No. 2 Reserve, the Hub, and No. 6 Colliery, relieved by a mid-day luncheon provided by the Coal Company. It is to be feared the visitors obtained a very hazy idea of the geography of the Glace Bay neighbourhood, as they rushed all day from point to point by special trains. Some of the visitors showed great interest in the submarine workings of No. 2, particularly Herr Bergrat Goebel, a genial gentlemen from Westphalia, who found even our eight foot Phalen seam to be a tight fit for his height and girth.

On the following day the party visited the works of the Steel Co. in Sydney, which is a tidy day's work when done thoroughly. In the evening, nothing daunted by the lavish hospitality of the Steel Co. during the day, the visitors partook of a banquet given in their honour as the guests of the Canadian Mining Institute, by the Mining Society of Nova Scotia. Governor Fraser elcomed the guests of the evening, and proposed the toast of Canada, which he humourously said no man but himself was large enough to do justice to. Those who know the Nova Scotian Fraser will appreciate this remark, for in every sense of the word Governor Fraser is a big man. Speechifying went on until some time in the wee sma' hours ayont the twal, including two speeches in their own language by our visitors from the Fatherland. One gentleman from London, Eng., hoped that next time he visited Canada the "town" of Sydney would have grown into a "large city." However by two-thirty international misunderstanding was reduced to a minimum, and the general flavour of "Scotch" which had pervaded the songs and the evening generally culminated in the singing of Auld Lang Syne in the orthodox manner.

On the Thursday the Nova Scotia Steel and Coal Co. took charge of the visitors and showed them all the wonders of Sydney Mines and its environs. The guests were each presented with a small and tasteful brochure containing a concise and well written account of coal mining at Sydney Mines from

the beginning on. Rumour has it that this brochure was not even written in manuscript a week previous to the visit of the British party. If so it is but another sample of the way they hustle on the other side of the water when occasion calls. Sydney Mines from its old associations with old country men and methods through the General Mining Association possesses more than ordinary interest to such a party as have recently honoured us with their presence, and the distribution of the little pamphlet referred to was no doubt appreciated as it surely deserved to be. Next day, declining the pressing invitation of the President of the Nova Scotia Steel Co. to visit Wabana, the visitors left for the West, and for rest we hope.

The visit of such an assemblage of mining men from across the water will be likely to prove of far greater value to industrial Canada than cart-loads of prospectuses and flotations on the London market. "When," to use the words of Governor Fraser, "these gentlemen have seen the sun arise out of his cold bath in the waters of the North Atlantic, and have followed his course past the Great Lakes, across the prairies, through the foothills, and over the Rockies, until they have seen him set in the warmer waters of the Pacific," they will understand somewhat of Canada's prospects, and of its mineral wealth, and they will go home to tell the news with the sure confidence of men who have seen what they are talking about. That is if they survive the trip across! It is no light task that these gentlemen have undertaken, and it is to be hoped that they will not be rushed around in quite such a breathless fashion for the rest of their journey as was the case in Cape Breton.

The "Times" has recently published a series of articles on "Industrial Canada" by Dr. A. Shadwell, and in the issue of August 15th Nova Scotia was dealt with. It is rather interesting at times to see ourselves "as others see us," and Dr. Shadwell's article is on the whole a fair and appreciative one. All the same it must be disconcerting to Haligonians to know that their city wears "a shabby, decayed, dead-alive air," and that Halifax "has not stirred for fifty years." In the portion that refers to Sydney, it is stated that this city is in the centre of the chief coal mines in the Dominion, "which is singularly poor in this most important source of wealth." Dr. Shadwell says that "there is, for all practical purposes, no coal between the Atlantic seaboard and the Rocky Mountains." We think this is not exactly true, but it is sufficiently true to accentuate the importance of our Cape Breton coal fields to the Dominion at large. Referring to the dispute between the Coal and Steel Companies, Dr. Shadwell makes some pertinent comments on American mehtods of finance, and refers to "a gentleman from Boston, of the name of Whitney, who seems to be a born promoter of the true adventurous type," the lagacy of whose financial enterprise Dr. Shadwell thinks affords "an instructive object lesson in the difference between American and British methods of promoting industries." If by "British" is meant Canadian methods we are inclined to agre with the writer in the "Times," and that this is the writer's intention is evidenced by his contrasting the works of the Nova Scotia Steel Co. and their development with the works and rise of the Dominion Iron & Steel Co., which latter Company our writer evidently thinks was originally handicapped by the mistakes of its American promoters, to whose door he lays three errors—first, too lavish capital expenditure, second, the launching of so huge a concern in pure anticipation of business to come, and third, incompetent management. Dr. Shadwell writes "In Canada they have a way, which does more credit to their courage than to their prudence, of taking hold of enterprises without any proper training or experience. They stick to it, learn from their own mistakes, and pull through; but it is very costly." Well, we have the consolation that Dame Experience charges high fees for her schooling, but then the instruction is very thorough. After devoting about two columns to Sydney, our writer dismisses Glace Bay in about a dozen lines as " a mining settlement, situated in a singular region," and tells of a party of Yorkshiremen who came, "took one look, and the next train back." We remember those same Yorkshiremen. Their fares out had been paid by the Coal Company, and this was their idea of honesty. We may further remark that there are a good many Yorkshiremen around the same singular region, who not only remained themselves, but sent for their families, their brothers' families, their mothers and fathers, and the third and fourth generation. The particular sort of Yorkshireman Dr. Shadwell has heard of is one that we can spare at any and at all times.

However it may hurt the civic pride of Sydney Mines and Glace Bay to contemplate the fact, we think Dr. Shadwell is right in regarding Sydney as the natural metropolis of Cape Breton. Its central position and its magnificent harbour mark it out for this destiny. Dr. Shadwell rather unnecessarily says that Sydney is "a long way from everywhere, and on the road to nowhere, except Newfoundland." We have an idea that Sydney is on the road to a good many places, and that it will not long remain under the stigma of being unknown in the old country, where Dr. Shadwell says the name is "usually associated with Australia."

The conclusion of the "Times" article is more to the point. It is as follows: "Nova Scotia, with its valuable mines, its admirable harbours, and the marked industrial capacity of its people, canot fail to carry its already considerable manufacturing interests into a very important position in the economic development of Canada."

Sydney—August 26.

Early this morning, August 26, the European and American delegates, along with the representatives of the Canadian Mining Institute, arrived in Sydney. Last evening a large body of members and ojcials of the Mining Society of Nova Scotia, together with Lieut.-Governor Fraser, Premier Murray, and other Government officials, had gathered to welcome the visitors, who, throughout their journeyings in Nova Scotia, are to be the guests of the above mentioned Society.

At 9.30 this morning the whole gathering left on a special Sydney and Louisburg train for Glace Bay. Here they were taken in hand by the Dominion Coal Company, represented by President Ross, General Manager Duggan, Sales-Agent Alex. Dick, and others. A luncheon was given at the Technical School building. The excursionists returned to Sydney at 5 p.m.

A smoker was tendered the visitors at the Sydney Hotel at 8 o'clock this evening. Addresses of welcome were read by Lieut.-Governor Fraser, and by Mr. C. J. Coll, President of the Nova Scotia Mining Society.

To-morrow, August 27, the visitors will be the guests of the Dominion Iron and Steel Company, who will also be their host at a luncheon.

Sydney—August 27.

The banquet tendered this evening by the Mining Society of Nova Scotia in honour of the Canadian Mining Institute and their British and foreign guests was eminently successful. At 9.15 p.m. the banquet commenced. Covers were laid for 175 guests, and the menu was a practically good one

Mr. C. J. Coll, President of the Mining Society of Nova Scotia, occupied the chair. He was supported on his right by Lieut.-Governor D. C. Fraser and upon his left by Premier Murray.

Shortly after eleven o'clock the toast list commenced. "The King" was hailed with loud acclaim.

"The German Emperor" was proposed by A. C. Ross, M.P., and responded to by Dr. Kraynik and Herr Bergrat Goebel.

President Coll proposed the toast of "Canada" and Lieut.-Governor Fraser responded becomingly, expressing the sincere hope that this visit would result in the encouragement and further development of Canada's great mineral industries.

Proposing the toast of "Sister Societies," Premier Murray touched upon the mutual benefits to be received from such excursions of distinguished industrial authorities as the gentlemen who were now visiting Canada.

Mr. Hugh F. Marriott responded for the Institute of Mining and Metallurgy; Mr. Walter Johnson for the Iron and Steel Institute. Mr. James Barrowman, on behalf of the Institute of Mining Engineers, made grateful allusion to the "superabundant hospitality" extended to him and his companions. Responding on behalf of the South of Wales Institute, Mr. W. J. Rees predicted that in a hundred years Great Britain would be importing her coal supplies from Canada. He alluded in appreciative terms to the plant and product of the Dominion Iron and Steel Company.

Dr. Herman Wupperman, representing foreign sister societies, spoke in German. He congratulated Canadians upon possessing in such abundance those natural resources that are in such world-wide demand.

Dr. William Campbell spoke for the American Institute of Mining Engineers.

Dr. W. G. Miller, President of the Canadian Mining Institute, paid a warm tribute to the hospitality extended to the excursionists by Quebec and Nova Scotia. Other speakers were Dr. Frank Adams, Mr. R. E. Harris, Professor F. H. Sexton, and Mr. Alex. Dick.

Last night, August 26, the visitors were given a luncheon by the Dominion Iron and Steel Company. They leave to-morrow morning for Sydney Mines, where they will be the guests of the Nova Scotia Steel and Coal Company.

Sydney—August 28.

The visiting mining men spent the last day of their stay in Cape Breton in visiting the plant of the Nova Scotia Steel and Coal Company at Sydney Mines and in enjoying the hospitality of that Company and of President James Ross of the Dominion Coal Company. The party, numbering in all about 80 persons, left here for North Sydney at 9 a.m., where they took special cars for Sydney Mines. There they were taken in charge by President R. E. Harris, General Manager Thomas Cantley, and Superintendent John Johnston.

Returning at noon to North Sydney, they were entertained at luncheon by the N. S. Steel and Coal Company in the rooms of the Eastern Club.

Lieutenant-Governor Fraser, Mr. James Ross, Premier Murray and other prominent citizens were present.

Later the visitors were taken on Mr. Ross's yacht "Shiela" to Mr. J. K. L. Ross's residence, where a garden party was given in their honour.

They leave for Quebec to-morrow morning.

ONTARIO.

Cobalt—September 5.

The Miller Lake (20 miles west of Elk Lake City) discoveries are most encouraging. The Miller Lake Syndicate claims show a number of healthy veins. Smaltite and niccolite are the chief vein constituents. The chief need of the district, after further prospecting, is the making of good roads. Prospecting will be carried on by several groups until snow interferes. After this attention will be directed to underground work. Small shipments of picked ore will be made as soon as the rivers and lakes are frozen. Silver is reported on one of the claims of the Moore-Logan syndicate. The three Gates claims are being actively opened.

A purse of three hundred and fifty dollars has been subscribed for prizes for the drilling contest on Labour Day, September 7. The first prize will be $200, the second $100, and the third $50. Diabase, not granite, will be the rock drilled this time.

Cobalt.

Hargreaves.—The litigation which has prevented the development of the Hargreaves lot which adjoins the Kerr Lake Mine on the south has been settled. The Government is to receive a royalty of 25% and costs of litigation. The title to the property is put in E. R. C. Clarkson's name. This property is very favorably situated and should prove valuable.

Silver Bar.—Work on this property, which adjoins the Savage on the south, has been suspended. The prospects seem to warrant the expenditure of a considerable sum of money in development work, as the physical condition of the property is excellent. The discovery of a very rich vein on the Savage and the locating of a strong vein of cobalt in shaft No. 2 on the Silver Bar indicate that further prospecting will develop a paying mine.

City of Cobalt.—Five cars of ore, a total of 127 tons, were shipped during the first week of September. One car of high grade ore went to Copper Cliff and three cars of low grade and one of medium grade to the American Smelting and Refining Co. at Denver, Col. The mine is in first class shape. At the 200 foot level work is being pushed on a 10 in. vein of high grade ore. Power has been obtained to date from the Cleveland Cobalt, but at the last meeting of the directors it was decided to purchase a 12 drill Sullivan Compressor. 13,157 shares of Treasury stock have been issued to shareholders at $1.00 per share.

Chambers-Ferland.—The first shipment made, consisting of 30 tons of high grade ore, went to Denver, Col., on September 2. Drifting has been started in both directions in shaft No. 1. A cross cut has been started at 80 feet in shaft No. 2. On September 5 a new vein was located in the northern part of the property from which a number of silver nuggets have been taken.

Trethewey.—Last month a dividend of five per cent. was declared. The statement made by the Directors of the financial position of the Company was as follows:

"Sept. 1, cash in bank, $123,543.96; due from smelters, $41,794.94; ore sacked and in transit, $23,112.79; a total of $188,451.69. The dividend takes $47,272.50, leaving a balance of $141,179.19.

The financial statement, August 31, 1907, showed cash in bank of $56,903.86, and ore on hand and in transit of $23,353.40. The net earnings of the Company have been at the rate of over 23% on the total issued capital of the Company. The physical condition of the mine has been greatly improved by recent development work."

The Company's financial year will be made to correspond with the calendar year. The annual meeting will be held in January.

The improvement in general conditions and the very encouraging development in the Cobalt District have resulted in the resumption of work on many properties in the outlying districts and a material increase in the working forces on many "prospect properties."

A force of men has been at work for some weeks trenching on the Cullen Cobalt property in Lot 1, Con. 12, Lorrain.

Several good calcite veins have been located on the Ritchie claim in Lot 2, Con. 12. A shaft has been sunk 20 feet on a calcite and quartz vein with niccolite and smaltite.

At the Big Fissure Mine, in Lot 3, Con. 11, Lorrain, work is being pushed on shafts No. 1 and No. 2. 35 men are employed.

A small compressor, boiler and hoist have been ordered by the St. Lawrence Cobalt Company and will be installed on the property on the south shore of Sasaginaga Lake.

Montreal River.—The past month has seen a very noteworthy improvement in the new camps in this District. The most important of which is the development of a rich vein of shipping ore on the Motherlode Mine, in James Township. This property was purchased this spring from Herbert Gates by a syndicate represented by W. R. Mowery. Mr. Gates had located a vein of decomposed calcite from which he took several hundred pounds of nuggets of very pure silver. A test pit sunk on the vein showed six to eight inches of vein matter but very small values. When the property passed to Mr. Mowery, it was decided to develop it by driving a tunnel in from the side of a hill with the expectation of cutting this vein at a depth of 80 feet. 36 feet from the mouth of the tunnel a cross vein was encountered and this was followed to the main vein. At the junction a vein of calcite, smaltite and silver, assaying from two to six thousand ounces was cut and a drift of 120 feet on the vein shows from 4 to 6 inches of shipping ore which for 25% of this distance will assay two to three thousand ounces. This is specially important, as many surface showings in this district are very similar to the original Gates discovery.

Cragg Claims.—These claims, which comprise 1,156 acres, are located in a narrow tongue of a diabase which extends from the Montreal River through Con. 6 in James and 1 and 2 in Smythe. They are controlled by Shirley Cragg, who is one of the pioneers of the Montreal River District. Six of the claims are passed, four on native silver discovery and two on cobalt with small silver values. On the S. W. ¼, N. ½, Lot 7, Con. 1, Smyth, three important veins have been located. Vein 1 has been uncovered for over 300 feet. The vein matter is calcite, decomposed on the surface, in which nuggets of native silver are found in a black muck. At a depth of 1 or 2 feet the calcite carries high silver values. The mineralisation and width of the vein are both irregular, running from one to six inches in width and from small values to 5,000 oz. in silver. On the S. W. ¼, N. ½, Lot 3, Con. 6, James, a vein has been uncovered for 400 feet on the contact between the diabase and conglomerate. The vein matter is calcite, from one to twenty inches wide, with occasional enrichment of cobalt and native silver. A shaft has been sunk on this vein. A comprehensive plan of development has been made and is being carried out under the direction of Mr. Cragg and Morgan C. Milne, his superintendent.

Gow Ganda Lake.—The latest discovery in the Montreal River District is near Gow Ganda Lake, four miles west of Miller Lake, between Miller Lake and the east branch of Montreal River. Rich ore has been sacked and brought into town.

BRITISH COLUMBIA.

Rossland.

Mr. W. Y. Williams, consulting engineer for the Granby Co., was in the city a few days ago looking over the work that has been done on the California-Giant since his last regular inspection. Development work has been in progress in the depths of this property for over a year, and the work is rapidly approaching a point where the sought-for ore body should be encountered. Mr. Williams, who is well-known by all the old-timers throughout this district, having for years been connected with the Granby mines at Phoenix, also has charge of the development work being done on the Independence group in the Similkameen, the Holden group in the State of Washington, and other promising properties. The Indepedence group is under bond to the Granby Co. for $100,000. Mr. Williams states that the work on the California-Giant is progressing in a satisfactory manner, and that good results are being obtained.

The Hattie Brown mine in the South Belt has been leased by two Rossland miners, and a good body of ore has been opened up during the preliminary work. The shaft on the Golden Rule is now down over thirty feet. The St. Elmo has joined the shipping list, having sent a car of picked ore to the smelter.

The big mines are maintaining a good average output for the present condition of the metal market. Shipments will be augmented as soon as copper reaches a normal figure. The ore shipments continue to run over 5,000 tons per week, the Centre Star shipping over 3,000 tons of this.

The following lead receipts at the Trail smelter (for the month of July) give a good idea of the amount of lead ore the different mines of the district are shipping to Trail and the proportion of lead in the ore of each mine:

Mine.	Net. weight. Pounds.	Lead contents. Pounds.
Arlington	228,204	5,975
Alpha	39,939	15,650
Blue Bird	29,106	1,863
Blue Bell	809,294	489,722
Curlew	13,479	566
Empress	2,138	17
Ferguson	170,015	47,260
Giant-Golden	35,564	24,118
Keystone	15,283	397
Little Robert	1,040	172
No. 1	27,432	823
Reco	81,162	33,982
North Star	1,408,949	290,298
Ruth	152,676	50,948
Sally	38,352	2,148
Slocan Star	46,586	17,796
Rambler-Cariboo	122,396	522,980
Richmond-Eureka	347,425	70,190
Sunset	163,407	110,274
Silver Glance	9,648	96
St. Eugene	4,622,696	2,657,835
Standard	372,769	241,730
Whitewater	577,963	260,668
Whitewater Deep	88,507	40,495
Westmount	86,758	6,770
	9,480,798	4,422,732

Boundary.

Ore shipments from the big copper producers of this district fell off to a considerable extent during the last couple of weeks of August. This was owing to the uncertainty of the coke supply. For the week ending September 6th the Granby shipped but 13,741 tons, the B. C. Copper Co. maintained about its average, 13,483 tons; the Snowshoe sent out 1,270 tons, and 60 tons came in from the Mountain Rose, making 28,554 tons for the week, and a total shipment from the Boundary District this year to that date of 881,378 tons.

It will be noted that the Snowshoe is now shipping ore to the Consolidated smelter at Trail, having sent out over 400 tons per day for three days of the week. Only a small amount of Snowshoe ore is to be shipped, while the price of copper remains as low as it is at present. This ore will be sent to the Trail smelter for fluxing purposes. Extensive development work is now in progress, and will be maintained on both the War Eagle and Snowshoe holdings of the Consolidated in Phoenix camp, and ore will be blocked out preparatory to heavy shipments the moment the condition of the metal markets warrants such action.

Seven of the furnaces at the Granby smelter are now in full blast, a fairly steady supply of coke being available from the Michel coke ovens, where the shipping facilities have been put in working condition again after the fire. No coke is coming in from Fernie yet, but it is expected that shipments will be

made from that point in the next week or ten days. Granby ore shipments will, no doubt, be up to their average during the present week. The furnace now cold at the Granby smelter is being enlarged. It will be made 4 ft. 4 in. longer than at present, or 22 feet in length, and it will take about three weeks to complete the job. All of the furnaces will be changed over in this way, and it will be well on into February of next year before the work can be completed, as they can only work on one furnace at a time.

The Granby directors in convention at Boston took no action upon the dividend question. It is stated that the dividend paid three months ago was not designated as "quarterly," and that a division of profits at this time was not necessarily due. While local stockholders, naturally, feel a little disappointed, still they recognize that action of this kind is to be expected immediately after a crisis such as has just been passed.

Mining operations have been resumed at the Brooklyn and Rawhide mines of the Dominion Copper Co. after a shut-down of several weeks. The big furnace at the Boundary Falls smelter will be blown in shortly as some coke is beginning to arrive on the ground. No shipments to the smelter were made by the Copper Co. last week, but their mines will, no doubt, show up on the shipping list during the current week.

The B. C. Copper Co. was affected but little by the big Fernie fire, as their supply of coke is obtained from the International Company at Coleman. They have maintained steady, average shipments while the Dominion Copper Co. was closed down, and the Granby Co. mines did not work Saturdays or Sundays lately.

Hon. Wm. Templeman, Minister of Mines, and W. R. Brock visited the mines of the Boundary during the past week.

G. P. Jones, superintendent of the Nickle Plate, Hedley, has secured an option on the Golden Zone for around $65,000. The Golden Zone is a promising mine and the 5-stamp mill recently erected is now giving satisfactory results.

The Apex, which the B. C. Copper had a bond on a short while ago, had now been bonded to W. D. McMillan. There is a good body of ore on the Apex. Development work is to be continued on the Fortune. The extensive gypsum deposit near Spence's Bridge is to be opened up in the near future. Operations will be begun shortly.

Charles Camsell, Dominion Geologist, has been looking over the platium bearing zone of the Upper Tulameen River. Topographical work is now being done in this district by the survey. As soon as proper transportation facilities are built into this district it will make a name for itself with its rich mineral deposits.

Nelson.

Ore shipments from this district for the past week amounted to 1,545 tons, making 61,585 tons for the year to date. Good results are being gained at the Blue Bell. A recently shipped car of ore returned over $600. A test car of Hewitt ore has been put through the zinc separating plant of the Kootenay Ore Co.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney, Sept. 9.—At 2 p.m. to-day fire was discovered in the extreme southern part of Section 5 of No. 1 Colliery of the Nova Scotia Steel and Coal Company. It was found impossible to approach within 100 yards of the fire. The section is filled with smoke and is being flooded. Flooding will take 48 hours. Work will be delayed for less than a week. It is thought that the fire is due to carelessness on the part of miners.

ONTARIO.

Sault Ste. Marie, Sept. 9.—The plant of the Algoma Steel Company will be re-opened on Sept. 15. Rush orders from the Transcontinental Railway are reported.

Cobalt, September 4.—The Temiskaming, in sinking a new shaft, supposed to be away from the ore bodies, where it could be used for the main shaft, struck a rich blind vein at a depth of 75 feet, of calcite, niccolite and native silver.

Port Arthur.—Fine specimens of ore showing chalcopyrite, hornite and visible gold have been brought into town lately from Sturgeon Lake district.

A winding-up order in the matter of the Atikokan Iron Company, Limited, of Port Arthur, has been granted at Osgoode Hall, and John Dix Fraser, manager, of Port Arthur, was appointed provisional liquidator.

The petitioners were Mackenzie, Mann and Co., Limited, creditors, for moneys advanced, to the amount of $2,523.

The Canadian Fairbanks Co., Ltd., got judgment some time ago for $1,241, and $38 costs. The sheriff made a seizure on August 28, and a sheriff's sale was advertised to take place on Sept. 10. According to the petitioners, the Atikokan is unable to pay its debts.

The Atikokan Iron Company, Ltd., was incorporated on April 14, 1905, "for carrying on the business of a mining, milling, reduction, and development company." The capital stock was $1,000,000, divided into 10,000 shares at $100 a share. "All subscribed, and fully paid," reads the petition.

Directors from Toronto were D. D. Mann, vice-president; William Mackenzie, and Z. A. Lash.

BRITISH COLUMBIA.

Fernie, Sept. 4.—Great progress is visible on the reconstruction of Fernie. Bricks are being made from a local deposit of clay, recently discovered, by the Fernie Brick Company. All buildings are to be fireproof, and a more beautiful city will arise on the site of the old. Brick and stone are used in the business buildings, and concrete for many residences.

Nelson.—The Silver King mine resumed shipments of ore to the Consolidated smelter at Trail on August 27 after some months of idleness.

During the fortnight ending August 22 there were upwards of 39 mineral locations recorded in districts centreing in Nelson. This is a cheerful indication of the general activity.

A rich find of gold is reported from the Granite-Poorman mine. Mr. J. Laing Stocks brought some specimens into Nelson on the 12th of August.

The mining industry has almost completely recovered from the temporary effects of the recent Fernie fire. While there has been a marked falling off of ore outputs and the Dominion Copper Company has temporarily shut down, an immediate recovery is certain.

Fernie, Aug. 26.—The corrected list of fire losses that are covered by insurance shows a total of $1,448,000. The largest

loss will be suffered by Lloyds, $235,000. The Phoenix Company of London comes next with $136,000.

Kaslo.—The Hon. Wm. Templeman, Minister of Mines, and Mr. R. W. Brock, Acting-Director of the Geological Survey, were informally entertained by a committee of business men on Monday evening, August 24.

Grand Forks, Sept. 1.—Plentiful supplies of coke have arrived and six of the Granby Company's furnaces are now in commission. The seventh and eigth will be started shortly.

Rossland.—A fifteen-stamp mill is to be erected at the Jewel mine on the Boundary.

Victoria.—There are now at the wharf bunkers of the Ikeda Mining Company more than one thousand tons of copper-gold ore awaiting shipment to the Ladysmith smelter. Monthly shipments at this rate are now possible from the Ikeda mines.

The B. C. Provincial Government has appropriated $35,000 for public improvement purposes in the re-building of Fernie.

YUKON.

Dawson.—The miners of Black Hills Creek are to have a road constructed. The local administration has made an appropriation and work already is well advanced.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Institute of Metals, founded June 10th, is established on a firm basis with Sir Wm. White as president and an influential council. Its membership includes representatives of the leading firms interested in the British metal trade, in addition to many prominent foreigners, and it is expected that when the first general meeting is held in November the number of members will have reached 500.

Valuable experiments are being carried out by the Mining Association of Great Britain at Altofts, in accordance with a recommendation of the Royal Commission on Mines, to ascertain the causes of dust explosions and the best means of preventing them. Some important results have been already obtained, showing the most promising preventive to be stone dust.

SPAIN.

A Parisian company has undertaken the working of the grey copper and argentiferous mines of Calcena, known for some centuries past, which have from time to time been extensively operated. An electric plant will be installed.

BELGIUM.

Prof. Nuel states that there are 17,000 miners in Belgium afflicted with nystagmus—an involuntary laberal oscillatory movement of the eyes said to be caused by working in a dim light. The remedy is the employment of improved lamps in place of the candle.

RUSSIA.

A number of English capitalists and Transvaal gold miners have gone to Eastern Siberia for the purpose of acquiring gold-bearing areas. A staff of mining engineers is included in the party.

A new branch of the Siberian Railway is projected from Irkutsk northwards into the gold-producing regions of Vitirusk and Olekminsk.

The Russian Dnieprovskiy Metallurgie Co. has contracted to supply 360,000 poods, or 5,806 tons, of steel rails to the Papanese government for the southern sections of the Manchurian Railway.

SOUTH AFRICA.

Efforts to locate the extensions of the famous Johannesburg vein or Main Reef series have met with but slight success. On the western end the series runs into the great Witpoortje Break, and the continuity of formation ceases, though auriferous patches may be found, and towards the east the series becomes spotted in value with stretches of barren ground interspersed.

The Zaaiplaats State mine experiment in the Transvaal has failed. The government attempted to solve the unemployed problem by finding the men with work in the tin fields, but the results were not satisfactory, and the government sustained a net loss of £4,000.

An eight hours bill, providing that eight hours shall be the maximum length of a work day and punishing all violations with fines or imprisonment for both employer and workman, has been introduced into the Transvaal Legislature. It applies to nearly all forms of industry, and is strongly opposed by the mining interests.

UNITED STATES.

Messrs. J. V. Thompson and I. W. Semans, of Uniontown, Pa., have sold 5,288 acres of coal land in Green County in that State to a syndicate who are organizing the Emerald Coal Co., the price being reported at $1,463,000. Plans for mine development and the construction of coke ovens are under way.

The mining town of Chisholm, Minn., of about 4,000 inhabitants, on the Mesaba iron range, was destroyed by bush fires on the 5th inst. The Pillsbury and Nartley mines of the U. S. Steel Corporation, six miles west of Hibbing, in the same neighborhood, were devastated.

A new and rich gold field, 37 miles from Cripple Creek, Colorado, and about 1½ miles west of the copper belt, is being developed. A rush of prospectors has set in and all available ground is being staked.

A strike of the union coal miners of Wyoming involving 10,000 men began on the 1st inst. owing to the reduction of wages by the Mine Owners' Association.

About 30 coal miners were suffocated in Hailey-Ola coal mine No. 1, near Haileyville, Oklahoma, on August 26th, when fire destroyed the hoisting and air shafts, cutting off air from the mine.

AUSTRALASIA.

The gold yield of Victoria for 1907 amounted to 695,576 oz. fine, valued at £2,954,617. This is a decrease of 76,714 oz. as compared with the previous year's output, which is accounted for by several of the lode mines working out, the closing of some of the deep lead mines and the lack of new discoveries.

Good reports are received from nearly all the Tasmanian

tin mines, recent rainfalls having furnished an ample supply of water.

CHINA.

A company has been formed at Shanghai, China, with $20,000,000 capital to take over the Hauyang iron and steel mines and the Ping Hsing collieries. One-third of the amount has been already subscribed.

MEXICO.

The Kansas-Cananea Copper Co., capitalized at $10,000,000, has been organized by a merger of the Mexican holdings of the Silver Mining Co., Cons. Gold and Copper Co. and the Miller Mining Co. The properties included are 1,350 acres in extent.

The burning oil well of S. Pearson & Sons, near Tampico, has been extinguished after some 3,000,000 barrels of oil had been destroyed.

STATISTICS AND RETURNS.

OUTPUT FOR AUGUST, DOMINION COAL CO.

	Tons.
1	42,985
2	58,156
3	25,739
4	36,197
5	40,308
6	18,825
7	18,113
8	20,754
9	39,997
10	15,462
	306,536
1st January to 31st August, 1907	2,296,269
1st January to 31st August, 1908	2,609,488
Gain over 1907	313,219

The August shipments from the Dominion Steel Company's plant broke all previous records in the history of the company. The details of the company's output (not shipments) for the month are:

	Tons.
Pig iron	21,000
Ingots	26,511
Steel rails	15,246
Wire rods	5,070

It is expected that a showing equally good will be made in September as the company has plenty of orders on the books.

North Sydney, N.S., Sept. 2.—The output of coal at the mines of the Nova Scotia Steel & Coal Company for the month of August exceeded that of the previous month by about 400 tons. The figures would have gone over 60,800 had not a break occurred in the working days caused by the men observing the annual P. W. A. day. On that day the mines were closed.

Following are the figures for the different collieries:

No. 1	19,344
No. 2	4,010
No. 3	23,359
No. 4	1,444
No. 5	9,731
Total	58,068

Coke blast furnace and open hearth are running full force. Prospects for the company's continued prosperity were never brighter than at the present time. The hearth resumed operations a few days ago and the first output from that department came out on Monday.

The output of the Crow's Nest Pass Coal Company for the week ending August 28 was 19,847 tons, a daily average of 3,308 tons. For the corresponding week of 1907 the figures were respectively 22,132 tons and 3,688 tons.

The output of the Crow's Nest Pass collieries for the week ending September 4th was 20,108 tons, a daily average of 3,351 tons.

COBALT ORE SHIPMENTS.

Cobalt ore shipments were rather light last week, totalling 1,018,000 lbs., or 509 tons, against 711 tons the previous week. Only eight mines shipped, the La Rose being the biggest shipper of the lot.

Total shipments for the year to date are 26,850,949 lbs., or 13,425 tons. Shipments for the week and year to date are:—

	Week ending Aug. 29	Since Jan. 1.
Buffalo	91,000	850,950
Kerr Lake	61,000	583,794
La Rose	414,000	4,758,612
McKinley	61,000	2,206,040
Nova Scotia	40,000	351,775
O'Brien	141,000	4,437,627
Townsite	40,000	211,700
Temiskaming & H. B.	120,000	1,108,500

A new shipper appears in the list of mines shipping from Cobalt Camp last week, the Chambers-Ferland property joining the shipping list with a shipment of 61,650.

Nine mines shipped 1,304,460 pounds, or 652 tons. The total shipments for the year to date are 28,155,408, or 14,077 tons. Shipments for the week and year to date are:—

	Week ending Sept. 5,	Since Jan. 1.
Buffalo	[illegible]	850,950
**Coniagas	64,700	[illegible]
Cobalt Lake	[illegible]	[illegible]
Crown Reserve	[illegible]	[illegible]
*Cobalt Central	[illegible]	[illegible]
City of Cobalt	[illegible]	[illegible]
Drummond	[illegible]	[illegible]
King Edward	[illegible]	127,240
Foster	[illegible]	[illegible]
Kerr Lake	82,200	666,174
La Rose	255,700	5,014,312
McKinley	[illegible]	[illegible]
Nipissing	187,910	2,902,160
Nova Scotia	40,500	[illegible]
Little Nipissing	[illegible]	[illegible]
Nancy Helen	[illegible]	367,427

O'Brien	189,000	4,626,627
Peterson Lake	.....	41,427
Right of Way	.....	736,180
Provincial	.....	143,210
Silver Leaf	.....	258,030
Silver Cliff	.....	52,000
Silver Queen	.....	1,123,990
Townsite	.....	211,700
Temiskaming	.....	645,680
T. & H. B.	.....	1,100,500
Trethewey	120,310	910,476
Watts	.....	790,166
Chambers-Ferland	61,650	61,650

*Concentrates. **Concentrates and high-grade ore.

Shipments of ore from the Cobalt Camp in the month of August totalled 2,366 tons, the largest output of any month so far in the history of the camp. By months, the shipments, in tons, with comparisons, were:—

	1907.	1908.	Inc.
January	980	1,325	345
February	903	1,173	270
March	1,027	1,832	805
April	533	1,317	784
May	1,158	1,601	443
June	1,939	1,581	*358
July	1,327	2,022	695
August	1,139	2,366	1,227

*Decrease.

B. C. ORE SHIPMENTS FOR WEEK ENDING AUGUST 29.

BOUNDARY SHIPMENTS.

Mine.	Week.	Year.
Granby	13,471	685,845
Mother Lode	10,492	119,091
Oro Denoro	1,580	37,888
Rawhide	220	10,740
Brooklyn	160	6,800
Sally	22	108
Other mines	.....	4,807
Total	25,945	865,279

SLOCAN-KOOTENAY SHIPMENTS.

St. Eugene	1,152	14,981
Whitewater	161	1,100
Whitewater, milled	280	10,660
Poorman, milled	250	7,850
Queen, milled	815	6,280
North Star	152	2,430
Richmond	251	1,439
Arlington, Erie	71	998
Bluebell	159	994
Standard	127	994
Rambler-Cariboo	39	882
Silver Cup	118	632
Idaho	89	362
Reco	21	228
Monarch	31	160
American Bay	20	20
Other mines	.....	14,736
Total	3,107	64,692

ROSSLAND SHIPMENTS.

Centre Star	3,149	111,455
Le Roi	1,586	50,541
Le Roi No. 2	682	19,449
Evening Star	30	718
Other mines	.....	192
Total	5,847	182,355

The total shipments for the week were 34,899 tons, and for the year to date 1,112,326 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	13,471	685,845

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	12,072	159,519

DOMINION COPPER CO.'S RECEIPTS.

Boundary Falls, B.C.

Total	380	21,812

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	8,103	190,071

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	1,586	50,541
Other mines	2,240	4,538
Total	1,826	55,079

The total selter receipts for the week were 35,852 tons, and for the year to date 1,118,056.

Kaffir houses in London estimate the current month's gold production in the Transvaal at 600,000 ounces. This would be a new high record, comparing with 584,455 ounces officially reported for July, which was itself a new record, and with 355,037 ounces in August, 1907.

Value of the August output, calculated on the basis of the above estimate, compares as follows:—

August, 1908	*$12,600,000	August, 1907	11,560,000
July, 1908	12,413,000	August, 1906	10,812,915
June, 1908	12,211,000	August, 1905	9,102,485
May, 1908	12,360,000	August, 1904	6,634,340
April, 1908	11,924,000	August, 1903	5,775,195
March, 1908	12,210,000	August, 1902	3,456,610

* Estimated.

COMPANY NOTES.

The Dominion Coal Co. declared the regular quarterly dividend of 1 per cent. on the common stock. It is payable October 1 to shareholders of record on September 18.

The Right of Way, which pays its fourth dividend this month, will have disbursed $140,000 to its stockholders. The price paid originally for the property was $50,000.

The regular quarterly 3 per cent. dividend has been declared on Temiskaming stock, payable October 1, to holders of record Sep-

tember 15. Owing to an error, this dividend was yesterday credited to the Tretheway company.

The directors of the Trethewey-Cobalt mine, in sending out dividend cheques for the 5 per cent. dividend recently declared, enclosed a brief statement, giving the financial position of the company at the 1st of September as follows:—

Cash on hand, $123,543.96; due from smelter, $41,794.94; ore sacked and in transit, $23,112.79; a total of $188,451.69.

The dividend takes $47,272.50, leaving a balance of $141,179.19.

The financial statement on August 31, 1907, showed cash in bank of $56,903.86, and ore on hand and in transit of $23,358.40.

The directors say: "During the past few month, notwithstanding the low price of silver, the net earnings of the company have been at the rate of over 23 per cent. per annum on the total paid-up capital."

La Rose Consolidated has issued a preliminary statement of production and earnings for the month of August, 1908:

	Tons.	Contents.	Net. value.
Shipments	645	278,570	$123,356
On hand August 31	40	78,000	40,050
Production	685	356,570	$163,406
Less on hand July 31	57.94	79,739	38,803
August production	627,06	*276,831	$124,603
Estimated expenses			16,000
Net profit for August			$108,603

*Ounces.

The La Rose Mines, Limited, reports the following preliminary statement of production and earnings for the months of June and July:—

June production—	Tons.	Contents. Ounces.	Net. value.
Shipments	178.7485	116,088	$55,600
On hand June 30th	41.991	77,711	38,267
Production	220.7395	193,799	$39,867
Estimated expenses			$11,000
Net profit for June			$82,867
July production—			
Shipments	507.110	305,459	$140,793
On hand July 31st	57.940	79,739	38,803
Production	565.050	385,198	$179,596
Less on hand June 30th	41.991	77,711	38,267
July production	523.059	307,478	$141,329
Estimated expenses			$14,000
Net profits for July			127,329
Total for June and July.	743.7985	501,286	*210,196

*Net profit.

The Kerr Lake Mining Co. has declared a regular quarterly dividend of 3 per cent., payable September 19. Books close September 14, and reopen September 21.

The annual report of the American Smelting and Refining Company for the year ended April 30 shows that 7 per cent. was eanred on the common stock. This covers the period during which the dividend was reduced from 8 to 4 per cent.

With the payment of a dividend of $5 just declared and calling for $500,000, the Calumet and Hecla Mining Company will have distributed to its stockholders a total of $107,350,000 since is organization. Three and six months ago the disbursement was $5. In the quarter before that it was $10, and a year ago $15.

MARKET REPORTS.

Coke.

Sept. 9—

Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.50-$1.60.
Foundry coke, prompt, $1.90-$2.00.

Metals.

Sept. 9—

Tin, Straits, 28.65 cents.
Copper, prime Lake, 13.875 to 14 cents.
Lake arsenical brands, 13.875 cents.
Electrolytic copper, 13.75 to 13.85 cents.
Sheet copper, 18 cents.
Copper wire, 15.25 cents.
Lead, 4.575 to 4.60 cents.
Spelter, 4.825 cents.
Sheet zinc, 4.825 cents.
Antimony, Cookson's, 8 to 8.125 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23,50 per oz.
Bismuth, $1.75 per lb.
Quicksilver, $42.50 per 75-lb. flask.

SILVER PRICES.

	New York. Cents.	London. Pence.
August 22	51 3-4	23 7-8
August 24	51 1-2	23 13-16
August 25	51 1-4	23 11-16
August 26	51 1-4	23 11-16
August 27	51 1-2	23 13-16
August 28	51 1-4	23 11-16
August 29	51 1-8	23 5-8
August 31	51 1-8	23 5-8
September 1	51 1-8	23 5-8
September 2	51	23 9-16
September 3	51 1-8	23 5-8
September 4	51 1-4	23 11-16
September 5	51 5-8	23 7-8
September 7	Holiday	24
September 8	51 7-8	23 15-16
September 9	51 1-2	23 3-4

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PROFESSIONAL DIRECTORY.

The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

ENGINEERS METALLURGISTS AND GEOLOGISTS

Dominion of Canada

Ontario

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Evans, J. W.
Gwillim, J. C.
Gillespie, G. H.
Haultain, H. E. T.
Hassan, A. A.
Hille, F.
Laird & Routley
Loring, F. C.
Mattair, L. H.
Roland, W.
Scott, O. N.
Tyrrell, J. B.
Willmott, A. B.

Quebec

Cirkle, Fritz
Hardman, J. E.
Hersey, Milton L.
LeRoy, O. E.
Robinson, A. W.

British Columbia

Baker, C. S.
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Jorgensen, C. E.
Langley, Musgrave & Williams
Rebbeck, James K.

FOREIGN—New York

Hassan, A. A.

ASSAYERS, CHEMISTS AND ORE TESTERS

Dominion of Canada

Ontario

Campbell & Deyell
Canadian Laboratories
Evans, J. W.
Heys, Thos. & Co.
John, D.

Quebec

Hersey, Milton L

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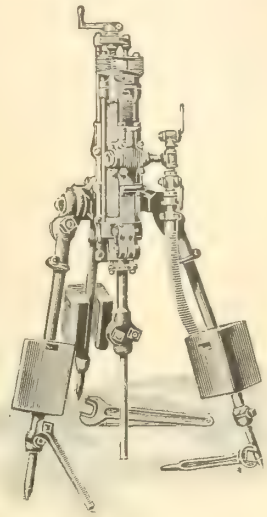
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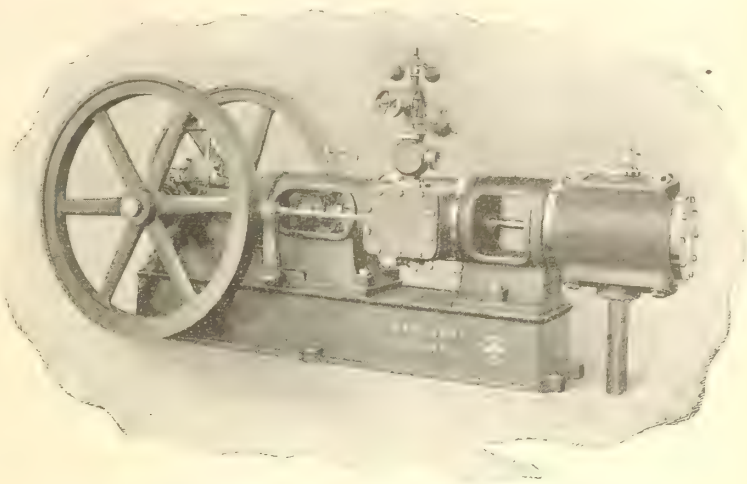
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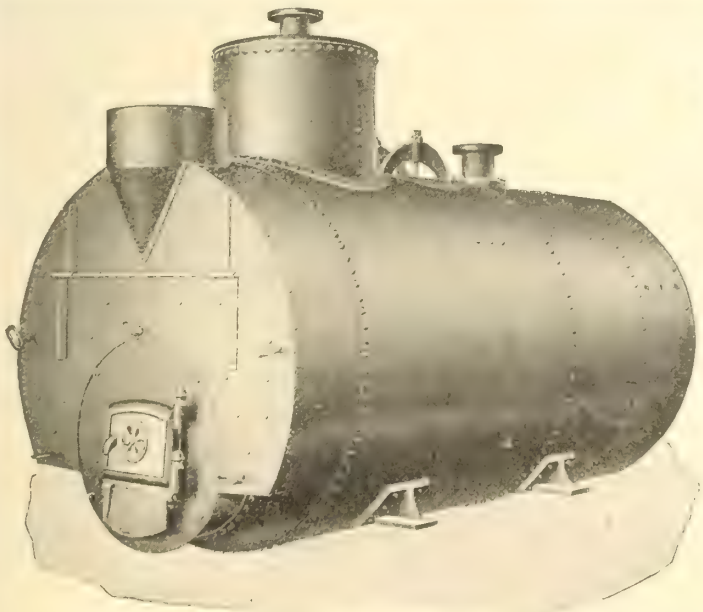
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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

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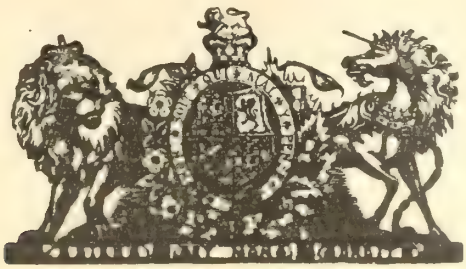
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Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

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The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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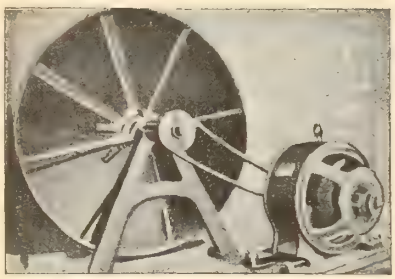
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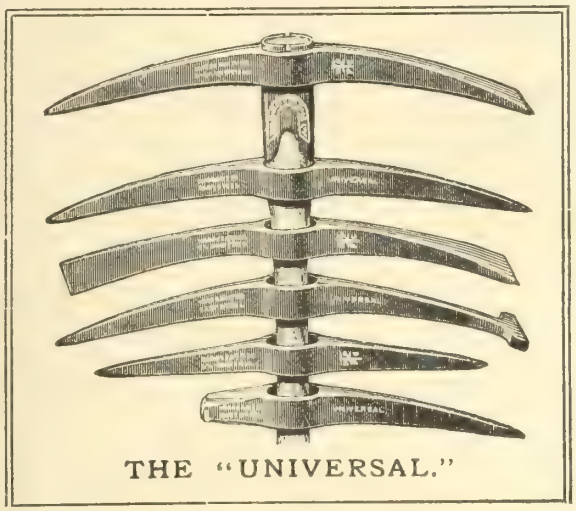
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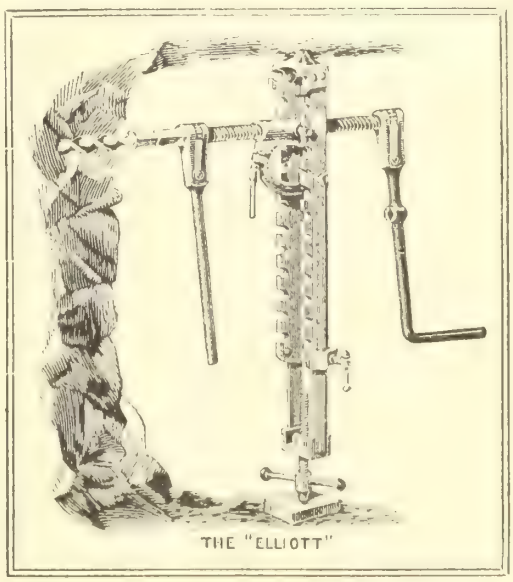
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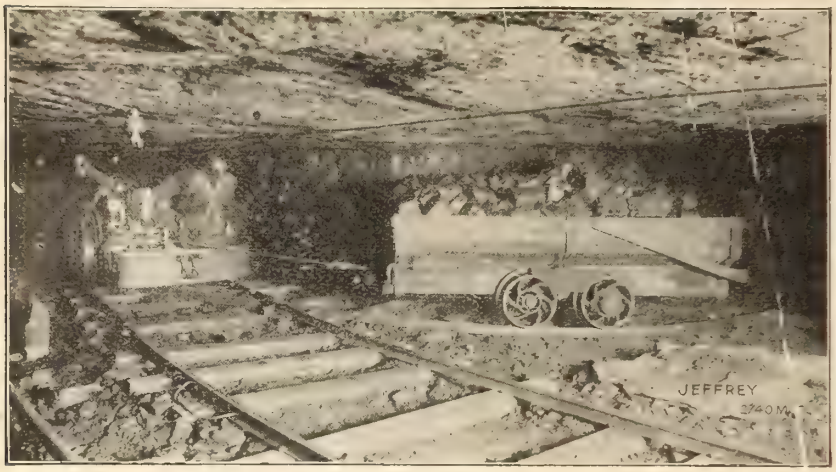


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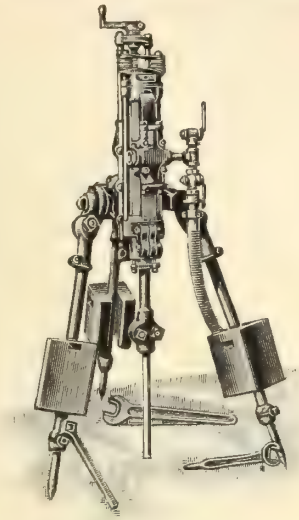
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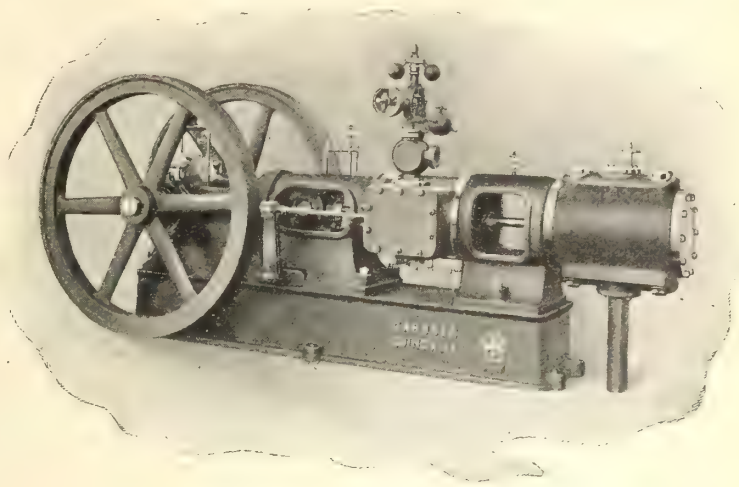
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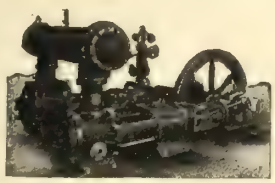
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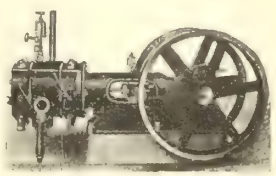
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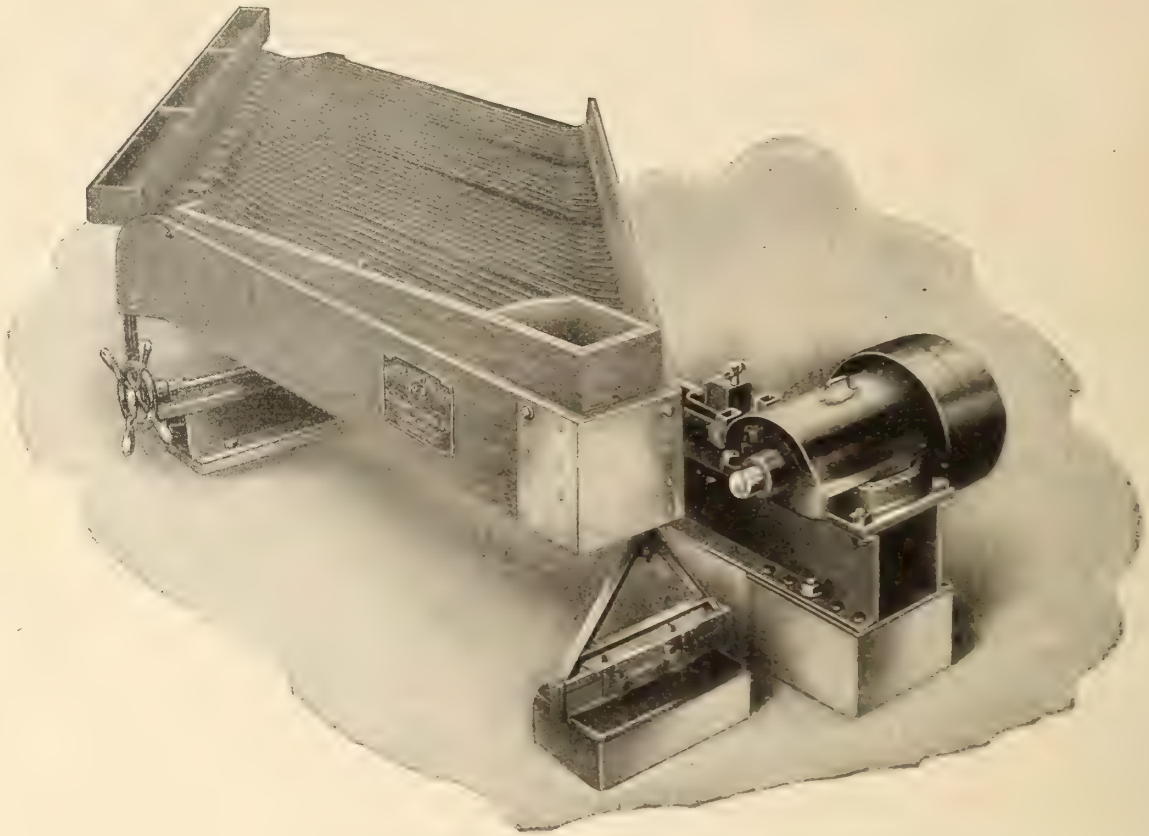
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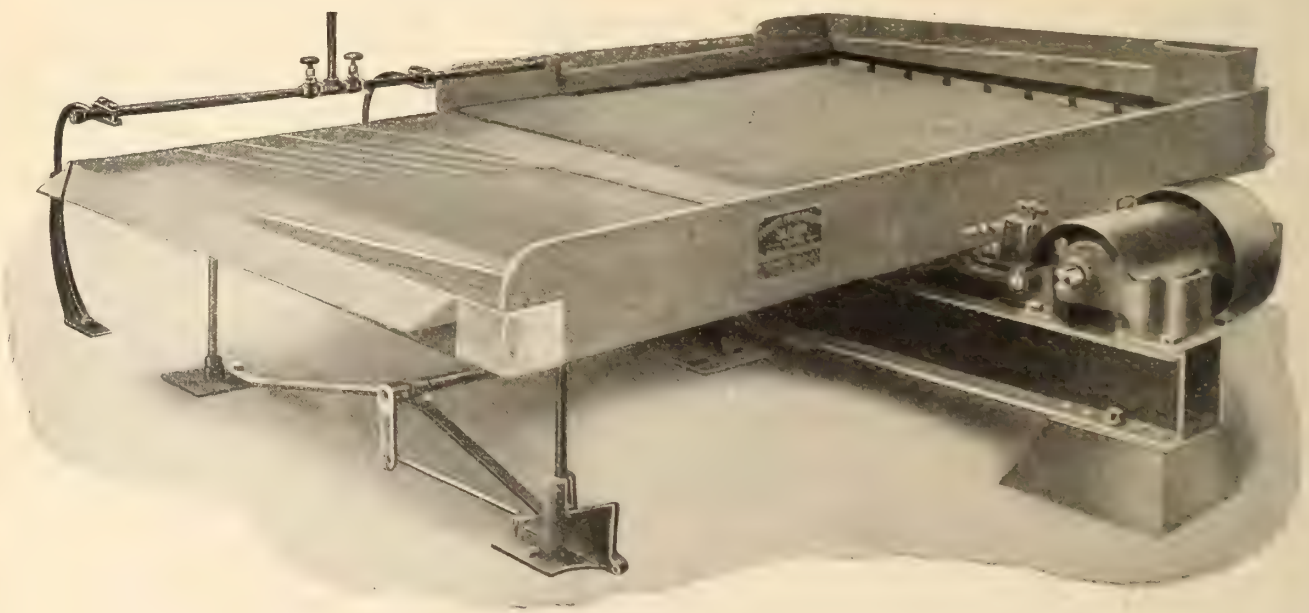
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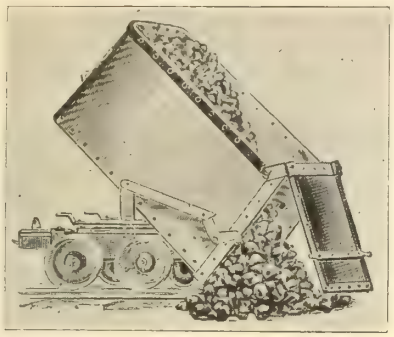


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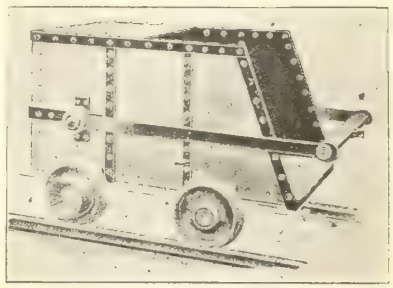
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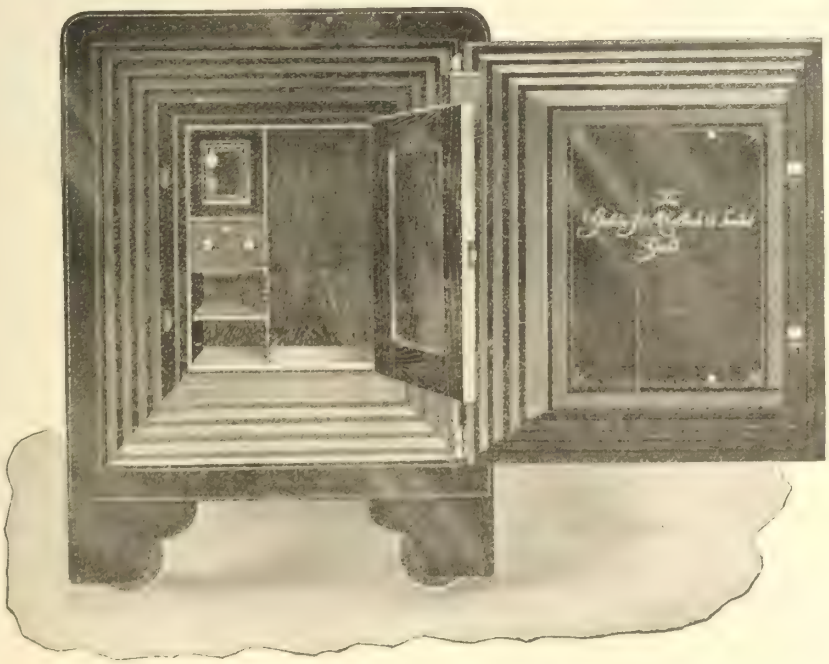
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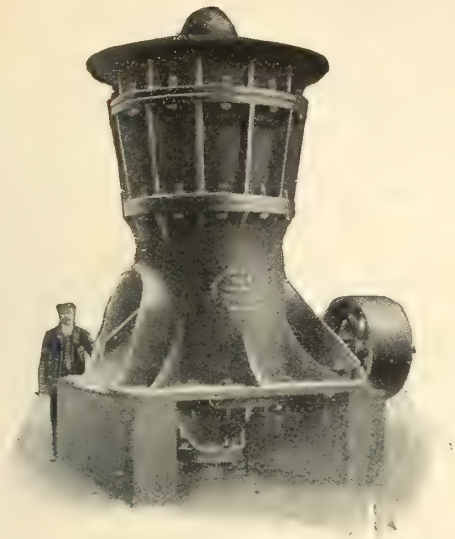
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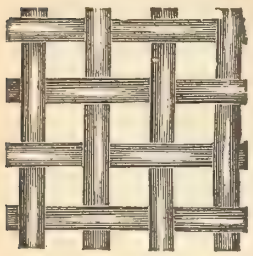
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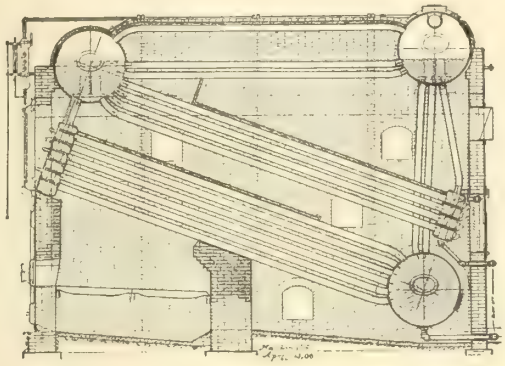
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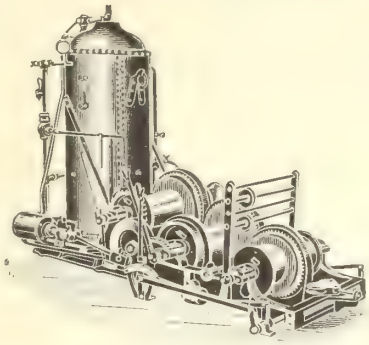
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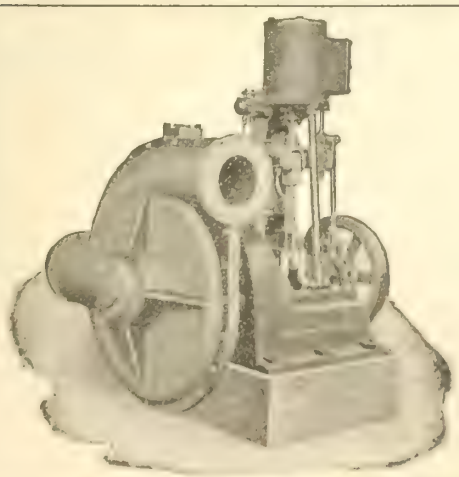
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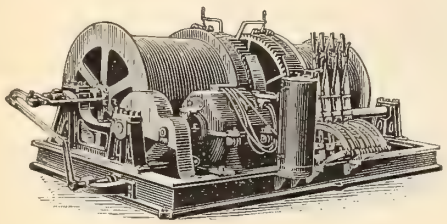
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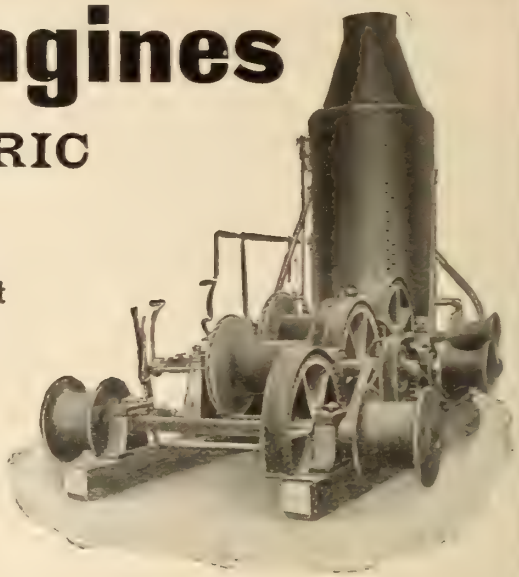
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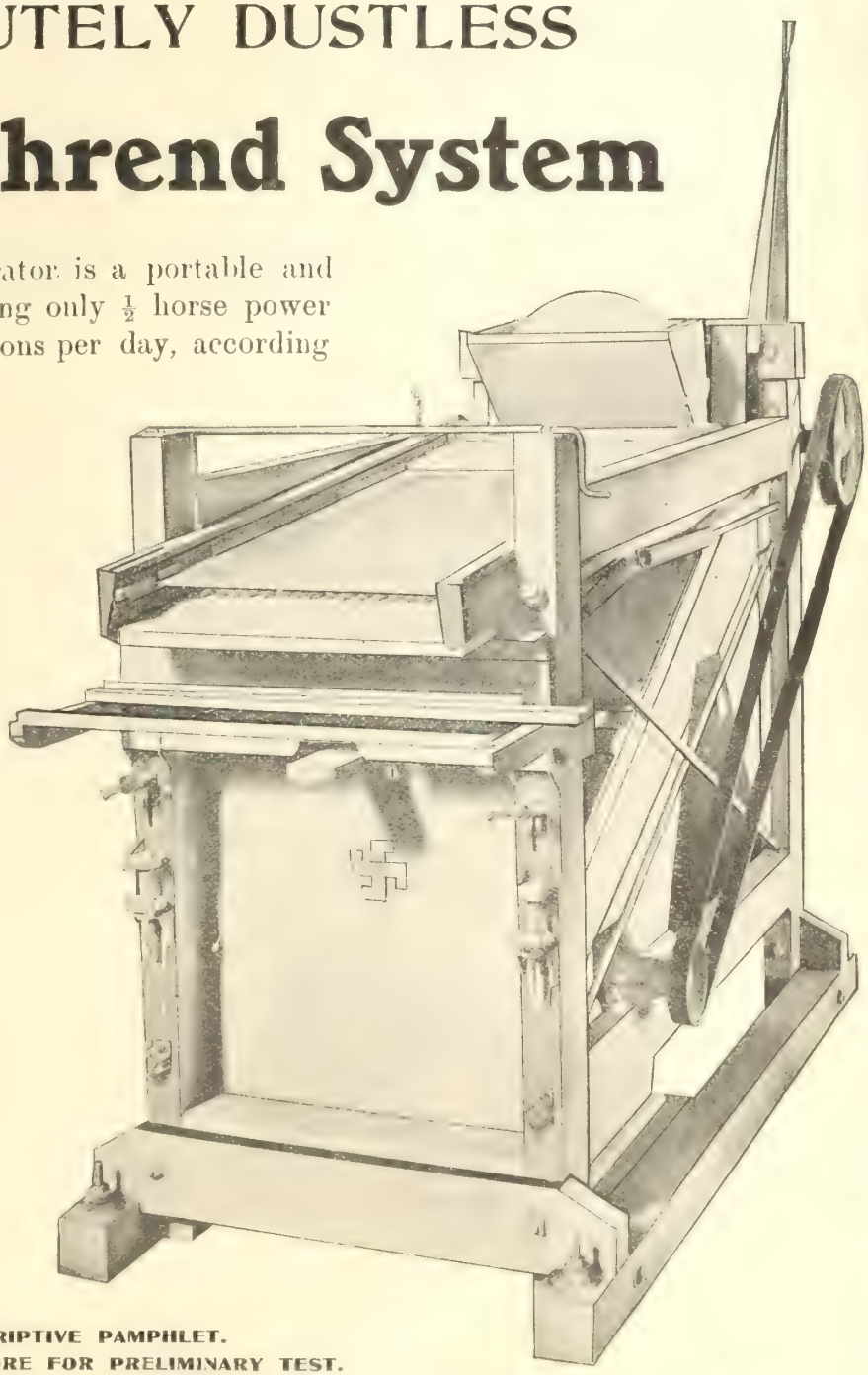
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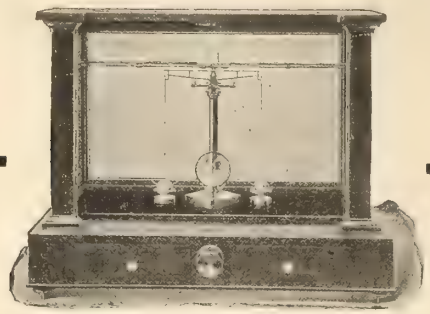
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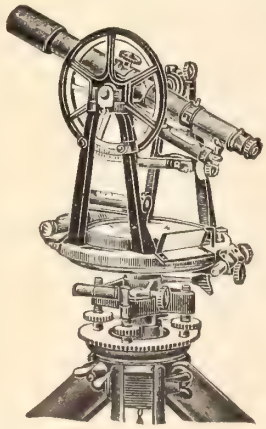
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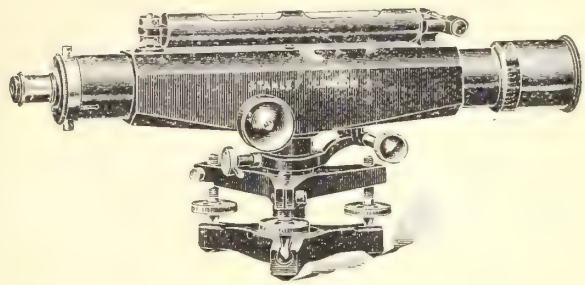
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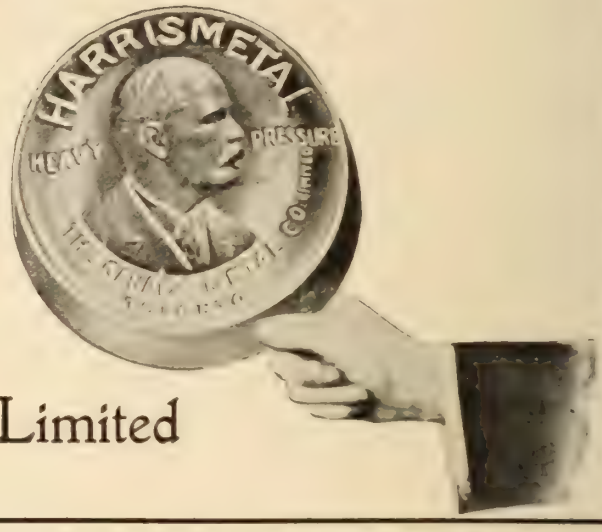
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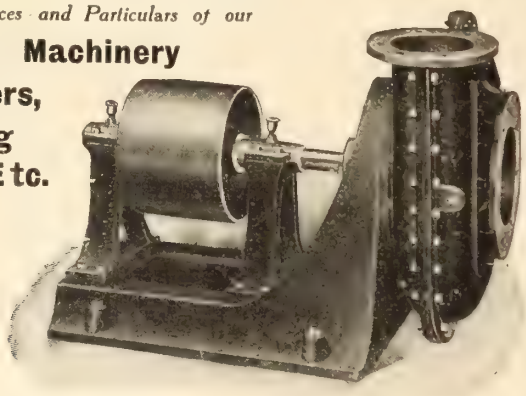


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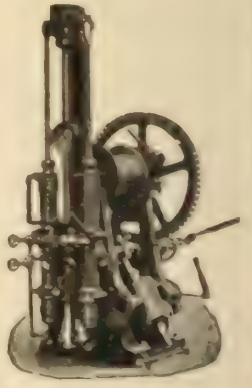
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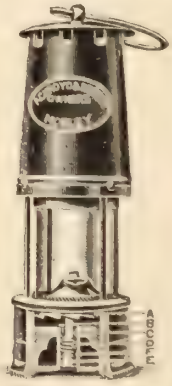


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THE CANADIAN MINING JOURNAL

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

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FIRE FIGHTING IN COAL MINES.

The first important call upon the Draeger equipment at the Dominion Coal Company's Rescue Station came on September 10th. A fire in one of the collieries of the Nova Scotia Steel and Coal Company threatened to do great damage. Unprotected miners found it impossible to get within fighting distance of the trouble. A call sent to the Dominion Coal Company met with a prompt response. Instructor James McMahon was despatched with 22 trained men from Dominion collieries 2, 9, 1, 3 and 5. Under singularly adverse circumstances the men, with the aid of the Draeger equipment, fought the fire at close quarters. The heat was so intense that it was possible for each relay to work only ten minutes at a time. Had the call come sooner, or had the Nova Scotia Company possessed an equipment of their own, flooding need not have been resorted to.

We have given a prominent place to Mr. Gray's article on the above-mentioned occurrence, especially because he emphasizes the national character of rescue and fire-fighting work in mines. The nations are awakening to a live sense of their duty in the conservation of natural resources. One most lamentable source of waste and loss is the colliery fire. The only practical safeguard is a well-trained corps of men, properly equipped with modern respiratory apparatus.

LARDER LAKE.

We are glad to present in this issue a short note on Larder Lake from Mr. H. L. Kerr. Our readers will observe that Mr. Kerr writes in a hopeful strain. In effect he states that from his personal examination of the district, there is justification for prospecting and exploratory development. Beyond this we think no competent mining man will go. It is true that striking gold specimens have been found. But the relatively small amount of sinking, drifting or tunnelling performed leaves the camp still to be classed as problematical. High purchase prices and capitalizations running into the millions have been and are the worst drawbacks from which Larder Lake can suffer. When a few payable ore shoots have been delimited and their value ascertained, there will be something to work on. Meanwhile good roads, fewer newspaper puffs, honest work and less talk are needed.

PARIS GREEN.

Out of 72 samples of Paris green examined in the year 1895, five were declared doubtful and 15 were found to be unmistakeably adulterated. Of late years, doubtless on account of the fact that the Dominion

Government investigated and reported upon the purity of the articles put upon the market, a great improvement has been observed. During the current year 150 samples, taken at random from retailers all over the Dominion, were subjected to analysis. Only one adulterated lot was found. The manufacturer of this lot was, we regret to say, a prominent Canadian concern. The sample showed incomplete solubility in ammonia. Adulterants were found in large amounts. Barytes, which would lend weight to the article, was present to the extent of 26.87 per cent., and acetic anhydride to 6.75 per cent. The pure samples were completely soluble in ammonia, and contained from 31 to 33.5 per cent. cupric oxide, and from 51.5 to 59 per cent. arsenious acid.

These figures are worth noting. Arsenic, which soon will become a staple metallurgical product in Canada, is the principal constituent of Paris green, and Paris green is itself an important article of commerce. We notice the names of four foreign manufacturers in the Bulletin issued by the laboratory of the Inland Revenue Department. It should be easily possible for Canadian manufacturers to meet the whole domestic demand.

DISCOVERY AND LOCATION.

The recent pronouncement of a United States authority to the effect that rigid requirements as to valuable discovery before location of claims would kill prospecting, has much to support it.

That discovery of valuable mineral in place is not an essential of legitimate location is tacitly acknowledged in all foreign mining countries. When the law demands such discovery, its requirements are either ignored or interpreted leniently. In several of the mining States local statutes allow a fixed period of time for marking the location after discovery. In the absence of statutory regulations it is usually understood that the prospector has a reasonable time in which to mark his location.

The tendency of mining legislation in this respect in the United States and elsewhere is strongly in favor of the man who is doing the work. Thus a prospector who has sunk a shaft, but who has made no discovery, is protected until he has made discovery. Upon discovery of valuable mineral he is allowed to make location relating back to the time of beginning work.

In this manner development is not hindered, nor false swearing encouraged.

CHINA'S NEEDS.

Reports from Shanghai indicate that China is soon to purchase large quantities of silver and copper. The Imperial Government is delaying purchase until the appearance of the report of an Imperial Commission appointed to reorganize and consolidate the Chinese coinage system. The design of both silver and copper coins is to be changed, the weights are to be increased and standardized, and the issue largely increased. The Imperial Government, after taking over all the provincial mints, will operate the plants at full capacity for some time.

There is now a pronounced scarcity of silver and copper coins throughout the vast and populous empire. An adequate expansion of currency will mean unusual demands upon the American metal producers. There is, then, sound cause for expecting a rise in the price of both silver and copper.

BREATHING APPARATUS.

The wisdom of providing collieries with breathing apparatus was illustrated lately in Nova Scotia. One section of a colliery operated by the Nova Scotia Steel and Coal Company took fire through the carelessness of employees. It was at first thought that flooding would have to be resorted to. But the Dominion Coal Company generously volunteered the services of men trained in the use of the Draeger apparatus. Equipped with these respiratory devices, the rescue party fought and conquered the fire at close range.

This is but one instance of the "insurance" value of modern breathing devices. Fires that, if left to run their course, would cause immense loss, can be coped with successfully by men instructed in the use of breathing helmets. For life-saving, after explosions, they are an absolute necessity. Their introduction into every coal mining district should be made compulsory.

ABITIBI LAKE DISTRICT.

Lying between the 48th and 49th parallels, the district surrounding Lake Abitibi is popularly supposed to be a barren, rocky, semi-arctic wilderness. Professor M. B. Baker, who has spent a few summers in the Abitibi country, contributes a letter to this issue of the Canadian Mining Journal. The statement that tomatoes can be grown and ripened so far north would be received with incredulity were the evidence not unimpeachable. This is but one item. Professor Baker's letter will be read with deep interest. He emphasizes the agricultural value of this section of New Ontario.

EDITORIAL NOTES.

We would especially draw attention to Mr. T. A. Rickard's able article on "Dredging in the Yukon," which appears elsewhere in this issue. Mr. Rickard is a mining engineer of the highest standing. He is editor of the Mining and Scientific Press of San Francisco, and he went to the Yukon this summer to study mining conditions there at first hand. In our issue of the 15th of January last, we had occasion to point out the inaccuracies of some statements made by a contributor to the Engineering and Mining Journal, with the deliber-

ate intention of belittling the mining, and especially the dregding enterprises that are being energetically undertaken in the Canadian Yukon. Mr. Rickard's article brings out the truth and justice of our contention that the mining engineers at work in the far north are proving that with a reasonable amount of time to work in, and abundance of water, the warmth of summer will extract the frost from the ground, and consequently that the frozen gold-bearing gravel can be dredged at a splendid profit.

As is explained in a letter from a correspondent in this issue, the name of an important producing gold mine was inadverently omitted from the list of Nova Scotia mines published by us on September 1st. Oldham has been one of the richest gold producers of the province. The omission was, therefore, a serious one.

The article on Mining in Western Australia should be read by Canadians. It shows what effective administration and sane methods can do. The records of dividends paid is astonishing. Canada should take the lesson to heart. We need less promoting and far more clean development.

With a few notes on the reception of the Canadian Mining Institute at Cobalt, we reproduce the scheme of Mr. A. A. Cole's mineral collection. Mr. Cole should have the gratitude of the community for his enterprise and energy. If these collections could be duplicated and placed within the reach of prospectors and others, we are sure that a large demand would be created.

The annual report of the Consolidated Mining and Smelting Company of Canada, excerpts from which appear on another page, announces that the gross value of metals produced at the company's smelting works up to date is over $31,000,000. During the year ending June 30, 1908, the gross value of metals produced was $5,428,501, as compared to $3,786,196, the production for 1907, being an increase of over 43 per cent.

THE USE OF OXYGEN BREATHING APPARATUS AT THE SYDNEY MINES FIRE.

By F. W. Gray.

A fire which occurred at Sydney No. 1 mine, of the Nova Scotia Steel & Coal Co. on the 9th September, has served to demonstrate the usefulness of oxygen breathing apparatus for underground fire fighting, and to bear out the statements put forward in a note by the writer, which appeared in the Canadian Mining Journal of 1st May last regarding lessons to be learnt from the fire at Hamstead, Eng.

The fire at Sydney mines originated some time towards the evening of the 9th inst. from a blown out shot. The seat of the fire was a partly driven room, set in some thirty feet from the back deep, at a point near to the barrier and distant about 2 1-4 miles from the shaft. The water supply was inadequate and subject to interruptions, being carried for the last 500 feet in ordinary firemen's hose, which burst under the great head of water. Owing to this the fire gained on the workmen, and involved the back deep and the room opposite to the one where it started. The fumes from the fire prevented a sufficiently close approach to make the hose stream effective in extinguishing the flames, and two men were rendered insensible by the "fire-stink." It was decided to ask the assistance of the Draeger equipment of the Dominion Coal Co. to enable the fire to be fought at closer range. A telephone message was received at Glace Bay about 8 p.m. on the 10th, and by 11 p.m. a party of twenty-four was got together, consisting of District Superintendent N. McKenzie; the instructor at the Rescue Station James McMahon, and twenty-two men from colleries Nos. 2, 9, 1, 3 and 5. Reaching Sydney at 12 p.m. they were taken by a special tugboat and arrived at Sydney No. 1 about 1 a.m. The face was reached about 3 a.m. and by 5 a.m. the fire was attacked. It was found possible to get within 50 feet of the fire in good ventilation, and a base was established at this point. The men attacked the fire in relays of three at a time, while others were detailed to brattice and timber as required. The whole of the operations were directed by Mr. McKenzie. The chief obstacle to the fighting of the fire was a heavy fall at the entrance to the second room into which the fire had spread from its original starting point on the other side of the back deep. It was found necessary to surmount this fall to get the hose on to the fire, and the heat was intense. The men could not endure it for longer than ten minutes, after which they had to retreat. The instructor would then relieve the retiring men of their apparatus and fit out a fresh relay, and so on. After working in this way from 5 a.m. till about 3 p.m. the fire was driven back and confined to the small room where it had originated. When this was done the Glace Bay men withdrew, and a dam was constructed by the workmen of the Nova Scotia Co. across the mouth of this room, and it was slowly flooded through a pipe left in the dam.

The work performed by the Glace Bay men was done under the most arduous conditions. The stream of water was so feeble owing to the breaks that it was necessary to get quite close to the flames to effect any good, and the interruptions to the water supply sometimes allowed the flames to recover the ground they had lost through the previous exertions of the workers. The heat was very great, and the steam scalded the men, until they obtained the protection of oilskins.

Some idea of the heat may be gathered from the statement of the instructor that the metal parts of the apparatus burnt his hands when taking it from the backs of the retiring relays. All the work of course was done in an atmosphere that would have been very quickly fatal to any unprotected person. The men worked by the light of electric hand lamps of the Hubbell type. Neither the weight of the lamps nor the apparatus seems to have caused the men particular discomfort. The protection afforded to the face and head by the helmets seems to have been of great value. One of the men wore a mouth breathing apparatus, as owing to his large physique no helmet had been found large enough to fit him. He suffered from the heat and steam on his face, and could not advance as far as those fitted with helmets, although he is an old fire-fighter. It is evident that for smoke and fire the helmet type is likely to be the most useful one.

The lessons of this fire are exactly those of the Hamstead fire, which we may quote in part from the article of 1st May, above referred to.

"1. To be really effective and useful in time of need, oxygen apparatus should be kept on the spot, and should be available for use instantly."

Had the Draeger apparatus been used at Sydney Mines when the fire was first noticed it could of course have been extinguished with much greater ease than was actually the case.

"2. It is absolutely necessary that men be trained in the use of these apparatus in conditions that are as nearly as possible actual conditions, that is, in really unbreathable gases. . . . Untrained men are worse than useless when the emergency comes. No man knows his hidden idiosyncracy until he makes the test."

In the case under review, there can be little doubt that the effective way in which the men from Glace Bay dealt with the fire and handled their apparatus was due to their having trained rigidly and conscientiously in the smoke chamber. Every man was known to be fit for the work.

3. . . . Relays of fresh men should be ready to take up the work."

Twenty-four men were in the Sydney Mines party, as compared with the small parties at Hamstead. They were able to work in relays and constantly relieve each other. Of course it must be admitted the conditions were distinctly different from those prevailing at Hamstead, for in that case the whole mine was involved.

"4. An adequate supply of oxygen and cartridges should be at hand."

The Glace Bay corps took with them ten apparatus, with sufficient spare oxygen cylinders, potash cartridges, and electric lamps to last each apparatus for twelve hours.

A further lesson, which although it may not meet with general approval, we consider cannot be too strongly emphasized, is the national character of rescue work in mines. The conditions which existed at Sydney Mines to occasion the visit of the Glace Bay corps did not fortunately involve any especial danger to human life. But there is a danger that where men have trained and lives are in danger the services of the trained men will be called upon. In our note of the 1st May we said: "We know that willing volunteers will never be wanting when other men's lives are in danger, and it is hard to refuse aid under such circumstances. But what right has anybody to expect volunteers from another district to risk their lives in the unknown workings of a strange colliery at long distances from their base of supplies? Such men are like the mariner in uncharted seas, and could be accused neither of cowardice nor inhumanity if under such circumstances they refused to endanger their lives. But we know they would not refuse, and therefore the national character of the matter becomes at once apparent."

That large corporations should equip their mines with such apparatus is a wise precaution on their part, and a cheap fire insurance premium, apart altogether from the humanitarian aspect. The coalfields of Nova Scotia are the property of the Government. Anything that will or may save human life is a matter for Government action. Therefore apart from anything that that the coal operators may do on their own initiative, we cannot see how either the provincial or the federal government can ignore their share of the cost and responsibility of this matter.

ANTIMONY.

Although a falling market throughout the year gave little encouragement to the development of American production of antimony, the output in the United States in 1907 showed an increase of 256 tons in quantity and of $19,497 in value as compared with the output of the preceding year, the total being 2,022 short tons, valued at $622,046, in 1907, as against 1,766 short tons, valued at $602,549, in 1906.

As usual the greater part of the antimony produced in the United States was that contained in antimonial lead and sold by the smelters in that form. As this alloy is extensively used in type metal, babbitt metal, coffin trimmings, and similar wares the two metals need not be separated.

The imports of antimony in 1907, in the form of metal, regulus, ore, and salts, exceeded even those of 1906, up to that time the greatest recorded, rising in value from $1,616,381 in the earlier to $1,686,802 in the later year.

The consumption of antimony and antimony salts in 1907, as shown by the addition of the values of production and of imports, amounted to $2,308,848.

A statistical report on the condition of this industry in the United States, prepared by Frank L. Hess, has just been published by the United States Geological Survey as an advance chapter from "Mineral Resources of the United States, Calendar Year 1907." Copies of this report may be obtained by applying to the Director of the Survey at Washington, D.C.

The death rate per thousand employees occupied in coal mining in the United States reached the startling figure of 4.86 in 1907. This is an increase of 1.55 over 1906, when the rate was 3.31. The number of tons of coal mined in 1907 for each life lost was 145,471 tons, as compared with 19,950 in 1906. West Virginia coal mines showed the highest death rate in 1907, 12.35 per thousand, and the lowest production of coal per life lost, 65,969 tons. Missouri's rate was the lowest, being 0.95 per thousand men employed, and 499,742 tons of coal mined for each life lost in spite of the general impression that the mine explosions are responsible for the majority of deaths in coal mining, it is found that while 947 deaths and 343 injuries ware due in 1907 to gas and dust explosions, yet 1,122 deaths and 2,141 injuries were caused in the same period by falls of roof or coal; and 855 deaths and 2,416 injuries were ascribed to other causes.

LARDER LAKE.

H. L. Kerr.

Although the optimistic hopes of some of the early prospectors in the Larder Lake country have fallen far short of realization, yet work done there recently has disclosed the fact that several promising bodies of gold-bearing quartz exist. Whether these locations shall develop into mines remains for the future to show. That there are ore bodies sufficiently rich to warrant the expenditure of money, in order to prove their value is readily admitted by those who take the trouble to visit the camp. It must be said that a great deal of the early work done by some of the companies was sadly misapplied, and that most of the booming of the camp in the beginning was most reprehensible. Still, it would be a great pity if the foolish talk of three thousand ounce ore in the early days, causes us to overlook the possibilities of large bodies of low-grade ore, which in all probability exist.



View of Larder Lake from Harris-Maxwell.

Both at the Maxwell-Harris, in the neighborhood of Larder City, and at least two other properties seven or eight miles distant, many fine specimens of visible gold have been found, and the hope is entertained that, associated with these rich spots are large quantities of low-grade milling ore. Work is progressing slowly at both ends of the lake with the object of proving this. One small stamp mill is already in operation, and two companies have ten stamp mills nearly complete. In



Vein from which rich specimens have been taken. This and all such veins require proving and development.

each case provision has been made for the addition of more stamps and in the meantime prospecting on the possible ore bodies is being pushed ahead.

It is possible now to reach the lake from Toronto in less than twenty-four hours. A year ago the journey took the best part of a week. The Pullman train leaving the Union Station at nine o'clock every night, goes as far north as Englehart, about twenty-five miles north of New Liskeard, which station is reached about nine o'clock in the morning. From here another train may be taken three days in the week, Monday, Wednesday and Friday to Dane (formerly known as Boston), where the stage for Larder City meets every train. (Return ticket to Dane, including Pullman both ways, is $21.00). The wagon road from Dane to Larder City which has been built by the Government, is in first-class condition for probably fourteen of the eighteen miles and the balance of it is being rapidly rounded into shape. The stages run are very comfortable and considering the locality the charge of two dollars and a half each way is not at all excessive. Larder City is usually reached before dark. Good meals and sleeping accommodation may be obtained at two or three places in the city. The city consists of less than twenty buildings with a stationary population of about fifty. A small steamer belonging to the Northern Ontario Navigation Co., makes two trips daily up the lake, making it very easy for one to visit any claims in which they may be interested. If one is not interested in mining he will find it a delightful spot to spend a holiday. Not only is there good fishing in the lake but moose are plentiful not far back.

The trip may be made to the camp about four hundred and fifty miles north of Toronto, all the important locations visited and perhaps a moose got on the side, all within a week.



Wendigo Wagon Road a Year Ago.

THE LAW CASE.

Many of our readers are interested in knowing how the prosecution of that enterprising quondam barber, Frank Law, is progressing.

The move on the part of Law's counsel to render proceedings abortive by claiming that Law had won immunity by giving evidence to the Crown, was met by Assistant Crown-Attorney W. H. Price in a sur-

prisingly frank letter, published in the Toronto Telegram. It may be explained that the case is now in the hands of the County Crown-Attorney, Mr. H. L. Drayton. Newspaper reports reflected upon Mr. Price, who conducted the prosecution up to the point where it was turned over to Mr. Drayton.

We publish herewith Mr. Price's open letter to Mr. Drayton. Mr. Price's letter states the case to our entire satisfaction. If there has been carelessness, indifference, or collusion, if the ends of justice are to be defeated, if a most unmistakable crook is to be allowed to escape without punishment, it is clear that the blame will lie on some person other than Mr. Price. The following is reprinted from the Telegram of September 17, 1908: "The following letter from W. H. Price, the commissioner who took the evidence in the Russell extradition case, to Crown-Attorney Drayton sets forth the facts in connection with the Law case in a new light. Mr. Price strongly urges the point that nothing has been done by the Crown in using evidence given by Law which should prevent his being prosecuted, notwithstanding the remarks of Judge Winchester.

Rex vs. Law.

Dear Sir,—I am handing you a memorandum of what took place before Mr. Law was examined on the extradition proceedings taken by the crown in Rex vs. Russell. You will see by this memorandum the position of affairs at that time. After this, Mr. Law left the room, and was away for about half an hour, while I proceeded with other witnesses who were on hand. He then came back, and after being told that he could either give evidence or not as he desired, he submitted himself to be sworn. I beg to draw your attention to the following facts in connection with this matter:

Consulted Mr. Cartwright.

1. When Law volunteered to give any evidence which would assist in bringing back Russell, I communicated with Mr. Cartwright, the Deputy Attorney-General, and discussed the matter fully with him. He was of the opinion that evidence given in the Russell extradition proceedings, as Mr. Law had requested, would not affect or interfere in any way with the case then pending against him in the sessions.

2. That Provincial Detective Rogers discussed the matter with Mr. Law, in my presence, and saw Deputy Attorney-General and had instructions from the deputy attorney-general to take that evidence on the extradition proceedings. Law not only at this time volunteered to give evidence, but offered to pay expense of extradition proceedings.

Law was Warned.

3. Law was told, as also was his counsel, Mr. O'Connor, that he could give evidence or not as he pleased; that it made no difference to the Crown.

4. That Mr. Law's evidence taken on the extradition proceedings against Russell could not in any shape or form be given as evidence against him. In fact there is nothing in this evidence which points against Mr. Law, neither was there any attempt to glean any information from him.



KERR'S LANDING—A TYPICAL LARDER LAKE CAMP.

5. That although Mr. Law's evidence on the Russell extradition proceedings was taken on the 28th of February, 1908, and two Sessions have passed, no objection had been raised by Mr. Law or his counsel, on the score that he had given evidence in the extradition proceedings.

Fully Aware of Proceedings.

6. That you were fully aware of what had been done in the Russell extradition proceedings some months ago, and discussed it with Mr. Corley, Mr. Rogers, and other parties.

7. That Mr. Blackstock notified you on Thursday, the 10th inst., that he would make this motion, yet I was not apprised of the fact until you had reached court, and apparently discussed the matter on Monday, the 14th.

The Usual Result.

8. That Mr. Blackstock, counsel for the prisoner, did not state in court that any arrangement had been arrived at with Law, but merely stated that he was used as a Crown witness, and the usual result should follow.

9. That the Judge's statement before hearing what you had to say was not fair to the Crown or to anyone connected with the case.

Plenty of Evidence.

In addition to these points, I draw your attention to the fact that we could not in any event succeed against Law, on the charge upon which extradition proceedings were taken against Russell. The charge of conspiracy to defraud must, as a necessity, cover almost all transactions of the firm of Law & Co., Limited. I do not consider, however, as a point of law or practice, that Blackstock has raised any point that cannot be met satisfactorily, I am quite satisfied that there is abundant evidence which points to Law personally, and which should leave no possible doubt as to his conviction.

Those Present.

The parties present at the time this evidence was taken were Magistrate Kingsford, Mr. Rogers, Mr. Angus, Mr. O'Connor and myself. I do not ask you to take what I have to say in the matter, but you can consult with any of them and verify all the material outlined in this letter. It seems to me that the position taken by the court on such flimsy statements and without hearing everything that could throw light on the case was entirely uncalled for and unjustified. There is nothing to prevent this case being called and disposed of at the earliest available opportunity. You may show this letter to Judge Winchester if you so desire.

Yours truly,

(Signed) WILLIAM H. PRICE.

Onus on Crown Attorney.

P.S.—The onus in this case is surely on the defence to show any arrangement, and the duty of yourself as Crown Prosecutor not to permit anyone to impugn the motives of the Attorney-General's Department or Crown counsel.

(Signed) W. H. P.

WESTERN AUSTRALIA.

Report of the Department of Mines for the Year 1907.

In mineral production Western Australia ranks second among the states of the great Commonwealth of Australia. During 1907 Western Australia's output represented a value of £7,640,153, of which £7,210,747 was credited to gold. In respect of the production of this precious metal Western Australia is far in the lead of any of its sister states. Its closest competitor is Victoria, with a gold output of £2,954,617. In total mineral production, however, New South Wales has a strong lead. The record of this state for 1907 was £10,577,378, of which £2,922,419 is attributable to coal and £3,658,632 to silver-lead ore.

Thus Western Australia, although it produces respectable quantities of copper, lead, tin and coal, is pre-eminently a gold-producing state. Its mining laws have, therefore, been evolved, interpreted and administered more particularly from the viewpoint of the gold industry. Gold mining languishes in Canada to-day. Defective legislation and the apathy of those in authority are not the least causes of this. It is possible that some valuable lesson may be learned from a survey of Western Australia's work.

Regarding the gold production of the several states of Australia, the Territory of Papua and the Dominion of New Zealand as a whole, Western Australia's share is 46.29 per cent.

For three years, however, Western Australia's output of gold has been falling, not seriously, but quite perceptibly. The Government is adopting strong measures to check this decline. As a consequence new regions are being opened and the tide is turning. In another section of this paper we shall notice the policy of the Department of Mines of Western Australia. Meanwhile the state's gold industry claims our attention.

From the illuminating character of the statistical tables that form part of the Annual Report is is evident that close and constant attention is paid to every phase of the mining industry. Table 5 gives us an analytical view of the production of ore and gold per man employed. The maximum tonnage per man employed underground and per man above and under ground is credited to the Peak Hill gold field, respectively 821.03 tons and 410.52 tons, with corresponding production of gold per man of 127.61 ounces and 63.81 ounces. The general average value of gold produced per man employed above and under ground was £438 in 1908, and £438.32 in 1907. The average tonnage of ore raised has increased from 173.31 tons in 1906 to 187.32 tons in 1907. The number of producing mines in 1907 was 1,062, a decrease of 89 as compared with the returns for 1906.

Up to the end of 1907 the enormous sum of £17,476,578 had been paid in dividends by Western Australian gold mining companies. During 1907 dividends to the amount of £1,738,163 were distributed. There are nine companies whose nominal capital exceeds £200,000 ($1,000,000). Eight of these companies have made dividend payments amounting to sums greater than their nominal capital, and in some instances have returned 400 to 600 per cent on the original stock. One company, the Great Boulder Proprietary Goud Mines, Ltd., operating in East Coolgardie gold field, and capitalized at £175,000 (shares 2 shillings par), paid £262,500 in dividends during 1907, and has paid to date a grand total of £2,644,300. This quite takes one's breath away.

Acreage.

Under ,507 mining leases are held 61,677 acres, of which gold mining leases account for 27,587 acres. Liberal conditions for prospecting have incited a large increase in prospecting areas. Classified and tabulated lists of all these holdings in each and every gold field are given.

Men Employed.

During the past year 16,058 men were employed in "reef" or "lode" mining on the gold fields; in alluvial

mining, 1,318; making a total of 17,926. It is significant that at the mines the number of employees above ground almost equalled the number under ground. The figures are 7,113 above and 8,945 below.

Accidents.

Forty-one deaths and 374 injuries is the record for 1907 in the gold mines. The first figures give a death rate of 2.55 per 1,000 persons employed for these mines. Eight deaths resulted from accidents above ground and 33 from accidents under ground, The fatal accidents (including four deaths in mines other than gold mines) are thus classified:—

	Deaths in 1907.
Explosions	3
Falls of ground	22
In shafts	8
Miscellaneous underground	4
Surface	8
	45

It may be noted that in 1906, 17 out of 40 deaths were due to falls of ground.

State Aid to Mining.

For nine years a system of state aid has been in vogue. There are now 29 state stamp-mills, 21 cyanide plants 3 slime plants (two of which were erected in 1907), 2 tin dressing plants, and one Huntington mill under Government operation.

Since the first state battery was started gold and tin to the value of £2,089,071 have been recovered at these plants; 505,286 tons of gold ore, producing gold to the value of £2,036,130 having been treated, and 31,166 tons of tin ore, producing tin to the value of £52,915. In addition gold to the value of £254,065 has been recovered by cyanide treatment, and £23,101 from slimes.

The tonnage of gold ore treated at state batteries has increased annually, until in 1907 the figures reported stand at 95,279 tons.

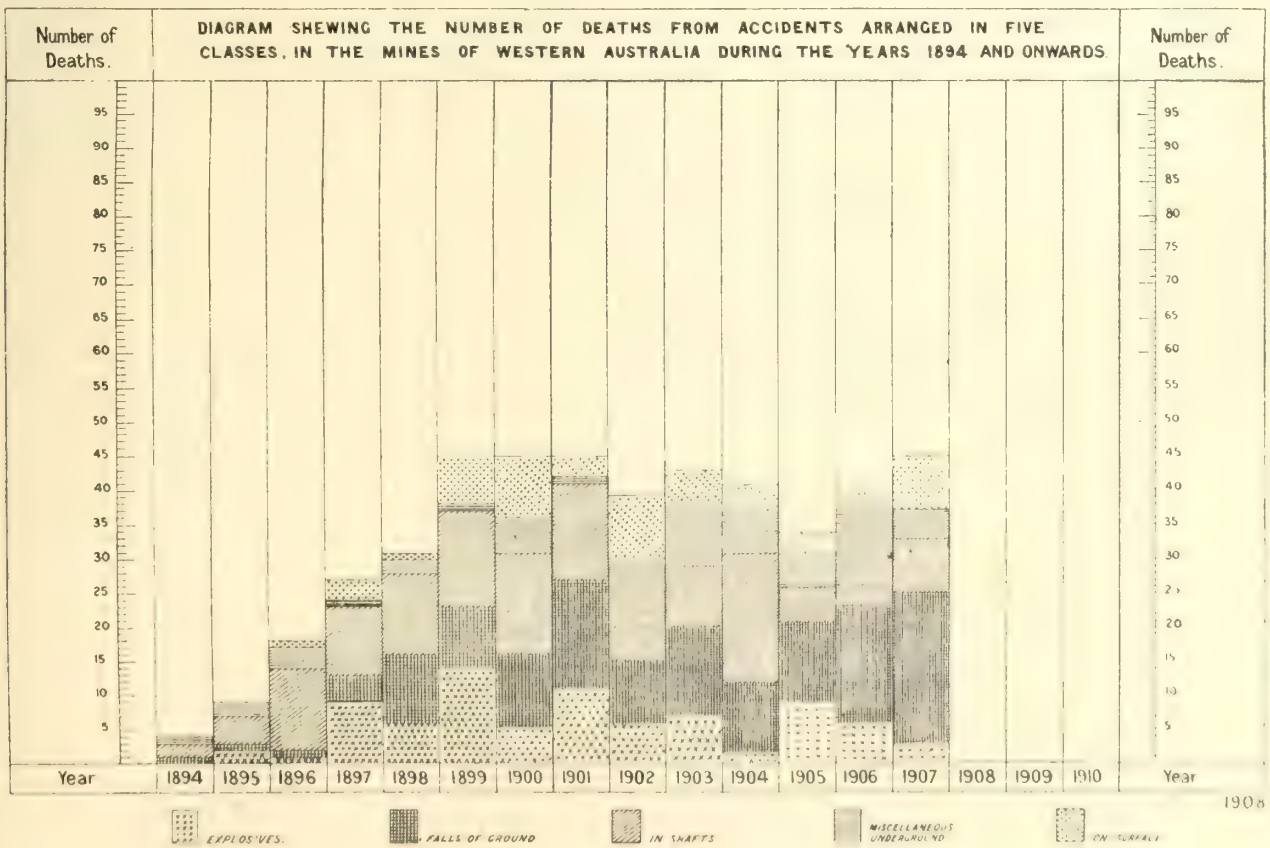
The revenue from all state plants was £91,274 during 1907, and the working expenditure was £91,351. Adding the sum of £1,622 spent in improvements, the net working loss for the year was £1,699. The plants used for the treatment of gold ore only show a loss on crushing of £8,724, and a profit on cyaniding and slimes treatment of £8,457. Expenditures from revenue in improvements and additions amounted to £1,622, leaving a net working loss of £1,889. To the end of 1907 the capital expenditure on state batteries and tin dressing plants was £237,029, and the working expenses for the entire period exceeded the receipts by £9,991.

The following statement, showing the sums advanced during the year 1907, under the provisions of the Mining Development Act, is worth reproducing:—

	£	s.	d.
Advances in aid of mining work	6,749	0	0
Advances in aid of boring	350	3	10
Advances in aid of crushing plants	1,000	0	0
Subsidies to provide crushing plants	2,300	11	0
Purchase of boring plants	2,490	16	2
Providing means of transport	1,052	19	11
Total	£13,943	10	11

In addition to the above, amounts totalling £7,832 11s. 4d. were expended from the Mining Develepment Vote on various matters for the assistance of mining, such as water supply, roads, subsidies to assist cartage or ore over long distances, drainage, timber tramways and subsidies for development work done below the 100-foot level in small mines.

Subsidies to the extent of £2,300 11s. were given to private crushing plants, the conditions being that they



crush for the public at fixed rates, in most cases conditions being imposed as to treating or purchasing tailings. The number of tons of ore crushed during the year was 38,143 tons. The receipts under the Mining Development Act, exclusive of interest payments, were £824 1s. 3d., made up as follows:—

	£	s.	d.
Refunds of advances	624	2	11
Sales of plant	199	18	4

Report of the State Mining Engineer.

The State Mining Engineer's report covers 19 gold fields. It is not our purpose to do more than notice a few outstanding features. There is much in each inspector's report for individual gold fields that is worthy of note. We shall be unable, however, to touch upon these beyond several specific paragraphs that deal with the equipment and work of operating mines.

In the Day Dawn division of the Central Goldfields division, the Great Fingall Consolidated Company operates the Great Fingall gold mine. The company is capitalized at £125,000 in shares of 10s. Up to the end of 1907 the company paid £1,543,750 in dividends. In 1907 alone it paid out £137,500. An account of its equipment should, therefore, be not without profit:—

Number of stamps dropping	100
	Feet.
Greatest depth of mine	1,880
Shaft sinking done in 1907	40
Drifting	2,432
Cross-cutting	739
Rising	2,884
Winzing	561
Diamond drilling	1,045½
	Tons.
Ore treated	261,057
Accumulated slimes treated	3,335
Accumulated slimes treated	1,085
	Fine oz.
Yield of gold over plates	56,451.093
Yield of gold from sands	19,502.630
Yield of gold from slimes	4,987.005
Yield of gold from concentrates	17,850.071
Yield of gold from accumulations	462.628
	Gallons.
Daily inflow of water about	30,000
	Fine oz.
Quantity of silver or other metals than gold	16,270.019
Average number of men employed under ground	332
Average number of men employed on surface	278
Cost per ton mined and hauled to surface	8s. 0.45d.
Cost per ton of ore treated	7s. 1,76d.

The working costs in this instance need fuller statement, but a rough analysis of the reported yield demonstrates that on a low-grade ore yielding about $7.60 in gold per ton (the yield of other metals is negligible), a handsome profit is obtained. On the plates about $4.30 per ton is recovered, or 56.6 per cent. of the gold content of the ore. Subsequent treatment, cyaniding, etc., accounts for the remainder. It is also noteworthy that the capitalization of the company is, roughly, $620.000. With 100 stamps installed the company returns to its stockholders more than their entire investment each year.

Interspersed throughout the reports of district inspectors are remarks concerning work in new and outlying regions. In the inland Mount Margaret and East Murchison gold fields, it is noted that many good prospects are spoiled because the men working them, though possessed of sufficient knowledge, have not enough capital to begin operations on a proper footing. Hence "they continue to work the richest ore until it

Table 7.

Dividends paid by Western Australian Gold Mining Companies during 1907 and Total to date.

(Compiled from information supplied by the Government Statistician's Office and the Chamber of Mines of W.A., Kalgoorlie.)

Goldfield.	Name of Company.	Par Value of Shares.	Paid up to	Nominal Capital.	No. of Shares issued.	Dividends Paid. 1907. No. of Dividends paid.	Dividends Paid. 1907. Total Amount.	Grand Total paid to end of 1907.
		£ s	£ s. d.	£			£	
Peak Hill	Peak Hill Goldfields, Ltd.							100,666
East Murchison	Black Range G.M. Co., N.L.	1 0 0	1 0 0	80,000	72,500	18	29,000	6,456
Do.	Havilah G.M. Co., N.L.	1 0 0	1 0 0	48,000	42,000	3	2,100	2,100
Do.	Other Companies							62,750
Murchison	Barrambie Ranges G.M. Co., N.L.	1 0 0	2,500 f.p. up / 47,500 p. up 15s.	50,000	50,000	2	3,750	3,750
Do	Great Fingall Consolidated, Ltd.	10 0	10 0	125,000	250,000	4	137,500	1,543,750
Do.	Other Companies							74,195
Mt. Margaret	Sons of Gwalia, Ltd.	1 0 0	1 0 0	350,000	325,000	4	65,000	458,175
Do	Other Companies							328,800
North Coolgardie	Other Companies							438,931
North-East Coolgardie	Queen Margaret G.M. Co., Ltd.	1 0 0	1 0 0	100,000	95,050	1	2,376	28,197
Do.	Other Companies							92,971
East Coolgardie	Associated Gold Mines of W.A., Ltd.	1 0 0	1 0 0	500,000	495,864	1	24,793	564,225
Do.	Associated Northern Blocks (W.A.), Ltd.	1 0 0	1 0 0	350,000	350,000	2	87,500	437,500
Do.	Golden Horseshoe Estates Co., Ltd.	5 0 0	5 0 0	1,500,000	300,000	3	255,000	2,520,000
Do.	Golden Ridge G.M. Co., N.L.	1 0 0	16 0	81,250	30,000	2	6,179	8,649
Do.	Great Boulder Perseverance G.M. Co., Ltd.	1 0 0	1 0 0	1,500,000	1,400,000	3	100,100	1,830,250
Do.	Great Boulder Proprietary G.Ms., Ltd.	2 0	2 0	175,000	1,750,000	4	262,500	2,644,500
Do.	Hainault G.M., Ltd.	1 0 0	1 0 0	150,000	150,000	1	7,500	46,013
Do.	Ivanhoe Gold Corporation, Ltd.	5 0 0	5 0 0	1,000,000	240,000	4	240,000	1,560,750
Do.	Kalgurli G.Ms., Ltd.	1 0 0	1 0 0	120,000	120,000	4	27,000	382,500
Do.	Lake View Consols, Ltd.	1 0 0	258,754 fully / paid, 91,246 / con. (5s. paid)	350,000	350,000	1	17,500	1,308,250
Do.	Oroya Brown Hill Co., Ltd.	1 0 0	1 0 0	450,000	450,000	4	288,750	2,058,300
Do.	South Kalgurli G.Ms., Ltd.	1 0 0	1 0 0	200,000	200,000	2	15,000	50,000
Do.	Other Companies							136,991
Coolgardie	Burbanks Main Lode (1904), Ltd	4 0	4 0	30,000	150,000	1	3,000	9,000
Do.	Other Companies							927,813
Yilgarn	Greenmount Co., N.L.	1 0	5	5,000	100,000	1	834	834
Do.	Other Companies							47,744
Dundas	Cumberland G.M. Co., N.L.	10 0	6 0	40,000	80,000	2	4,000	18,000
	Other Companies							127,000
	Total Dividends paid during 1907						£1,788,163	
	Total Dividends paid to end of 1907							£17,470,578

gets below the payable stage with the appliances used and then abandon the place." So difficult is transportation in this part of the state and so costly are all kinds of supplies, that one enterprise abandoned a prospect as not then payable, although 1,357 tons of ore crushed yielded 1,309.71 oz. of gold over the plates of a five-stamp mill. In these remote mining fields camel teams are one of the principal means of transportation.

East Coolgardie gold field, with an area of only 532 square miles, occupies the first place as regards gold returns and dividends. During 1907 the gold mines of this field paid £1,489,697 in dividends. The larger mines are all served by railroad connections. Water is supplied by the Government, which controls an elaborate system. Close check is kept upon the daily consumption of water at the mines. Owing to the magnitude of mining operations the sand dumps around the mines are so high that they have become "a nuisance to the town . . . owing to the sands being carried by the wind." Arrangements are being made to sluice the residues away from the mines.

The Golden Horseshoe Company, operating in East Coolgardie, has erected a large and complete change house for its 882 employees. The building is fitted with wash-basins, shower-baths, swimming-pool, etc., and hot and cold water are laid on. The used water is pumped back to the batteries. It may be mentioned in passing that this company, with a capital of £1,500,000, paid dividends to the end of 1907 amounting to £2,520,000.

The inspector for the last-mentioned gold field adds a note of keen criticism regarding the competition among managers to report low treatment costs and large percentage savings. He first alludes to the apparent contradiction between the low values reported for tailings from certain treatment plants and the fact that several of the mines are erecting ore treatment plants. Further, he animadverts upon the disastrous effect of competition for reduction of figures of cost per ton. Although "by incurring further cost of 3 shillings per ton another pennyweight of gold, worth 4 shillings, can be extracted, there is a strong temptation for the manager nevertheless to let the profit go, rather than show costs 3 shillings a ton higher than those of his neighbors."

Among the reports of ore treatment costs we notice particularly favorable returns from two mines in the Yilgarn gold field. At the Never Never Gold Mine ore is being mined for 1s. 3d. per ton, milled for 3s. per ton, and cyanided for 3s. 6d. per ton, a total cost of 7s. 9d. per ton for mining and treatment. At the Queen's Cross Gold Mine, Coolgardie, ore is being mined and milled by a party of tributers at a total cost of 5s. per ton. It is remarked by the inspector that "plants are now erected to reap profits from the large and more persistent low-grade ore bodies rather than from the high-grade ore shoots which characterized the operations a few years ago."

General.

The operation of the Mines Regulation Acts, which are stringent and wholesome pieces of legislation, appears to have a salutory effect upon mining. Negligence on the part of employees and miners is discouraged by means of promptly levied fines. Reported cases of non-compliance with statutory requirements are investigated with little loss of time. Managers, shiftbosses and miners are included in the list of convictions.

Sunday labor is countenanced only where necessary. Legislation provides that only those who have secured special permits fro man inspector can Sunday work be legally undertaken. "In the case of one large mine," writes the State Mining Engineer, "I have been assured by the management that the cessation of Sunday work underground not only resulted in no loss, but was an absolute advantage to the mine in its working expenses."

We cannot in the space now at our disposal, touch upon the copper, coal and iron ore production of Western Australia. Before closing, however, in view of the recent discovery of scheelite in Nova Scotia, it may be timely to notice an occurrence of this mineral at Kundip, in the Phillips River field. Here a quartz vein carries gold and scheelite. After stamp-milling the scheelite was concentrated out and 17 bays were filled. Following are the particulars of the marketing:—

17 bags scheelite, gross weight..... 979 kilogrammes
17 bags scheelite—gross weight.... 979 kilogrammes
net dry weight. 943.38 "
net weight .... 950.7 "
Agreed assay: 75% WO_3 (tungstic oxide)
= 707.535 kilogrammes,
@ 45.50 marks per unit per 1,000 kilos
= M 3,219.30
Less charges.. 59.50

M 3,159.80

	£	s.	d.
@ 20.45 M to £1 =	154	10	4
Less stamps, comm'n and interest	4	7	1
	£150	3	3
Less charges of transport, etc.	11	2	1
Net proceeds..	£139	1	2

This profit appears profitable on a consignment of less than a ton.

TALC AND SOAPSTONE.

Extract of advance chapter of mineral resources of the United States:—

Production.

Including the production of fibrous talc, most of which is quarried at Gouverneur, St. Lawrence County, N.Y., the total output of talc and soapstone in the United States in 1907 amounted to 139,810 short tons, valued at $1,531,047, an increase, as compared with 1906, of 19,166 short tons, or 15.9 per cent., in quantity and of $99,491, or 7 per cent, in value. The inceased production in 1907 was distributed among all the new important producing States.

The smaller percentage of increase in value was not due to any general decline in price, but to a larger proportion of the product which was sold in the crude or unmanufactured state, and in this portion of the product there was a decline in price. By far the larger number of the talc and soapstone quarries are operated or controlled by the manufacturers, and only a comparatively small part of the output is sold in the crude state. In 1907, however, there was an unusually large quantity sold crude, and part of this was low-grade material. The quantity sold crude in 1906 was 15,211 short tons, having an average value per ton of $2.65. In 1907 the marketed production of rough or unmanufactured soap-

stone was 25,538 tons, at an average price per ton of $1.36, so that while the quantity sold exhibited a gain of 10,327 short tons, or about 66 per cent., the total value decreased $5,712. The average price for ground soapstone was the same in 1907 as in 1906, while prices for manufactured articles or partialy manufactured materials were higher.

The talc and soapstone production is classified in the following four groups: Rough or crude, sawed into slabs, manufactured articles, and ground. A part of the crude product, represented in the first group, is sold to factories, and some of this is probably again included in the estimates of manufactured articles or ground materials represented in the other three groups, though duplication is avoided if possible. The relative quantities and values of these varieties produced in the United States during the last year are shown in the following table:

Condition in which marketed.	Quantity (short tons).	Value.	Average price per ton.
Rough	25,538	$34,625	$1.36
Sawed into slabs	4,822	91,668	19.01
Manufactured articles	23,484	648,475	27.61
Ground	85,966	756,279	8.80
	139,810	$1,531,047	$10.95

Production of Fibrous Talc in New York.

Practically all of the fibrous variety of talc produced in the United States comes from the vicinity of Gouverneur, St. Lawrence County, N.Y. It is all ground and is used principally for filling in the manufacture of medium grades of paper, though some goes into the paint trade, and some is used in the preparation of wall plasters, for which its fibrous character and heat-resisting quality make it well adapted. The production of fibrous talc in New York in 1906 and 1907 is shown in the following table:

	1906.		1907.	
Use.	Quantity.	Value.	Quantity.	Value.
Paper filling	61,672	$557,200	67,800	$626,000
Paint	61,672	$557,200	67,800	$626,000
Wall plasters	61,672	$557,200	67,800	$626,000

Imports.

The imports of talc into the United States have never been large, though the prices obtained are usually somewhat higher than the averages shown for the American product, and the values quoted for the foreign material are at point of shipment and are exclusive of freight and duty. The reason for these higher values may be attributed to the fact that only the fancy grades, which are used for the manufacture of face power and for medicinal purposes are imported into this country. The imports in 1907 showed an increase of nearly 50 per cent., both in quantity and value, over 1906.

Talc imported into the United States, 1902-1907, in short tons:—

Year.	Quan.	Value.
1902	2,859	$35,366
1903	1,791	19,677
1904	3,268	36,370
1905	4,000	48,225
1906	5,643	67,818
1907	10,060	126,391

Canadian Production.

There has been a small production of talc in Canada for several years, but the tonnage and values have varied considerably. In 1907 the production amounted to 1,534 short tons, an increase of nearly 25 per cent. over that of 1906, which in turn was more than double than that of 1905. The Canadian Geological Survey reports the production of talc in the Dominion for the last six years as follows:

Production of talc in Canada, 1902-1907, in short tons—

Year.	Quan.	Value.
1902	689	$1,804
1903	688	2,064
1904	840	1,875
1905	500	1,800
1906	1,234	3,030
1907	1,534	4,602

NOVA SCOTIA PERMANENT EXHIBIT.

In our last issue we gave a brief illustrated account of the mineral exhibits sent by the eastern and western provinces to the Canadian National Exhibition at Toronto. No detailed description of Nova Scotia's min-



Hon. C. P. Chisholm, Minister of Mines, Nova Scotia.

eral exhibit was included in this account for the reason that an article covering this ground had been published in the Canadian Mining Journal of May 15, 1907, and to this the readers were referred.

We decided at the time, however, that, although space would not permit printing a full list of the Nova

Scotian display, something more was due than mere mention.

The conditions under which Nova Scotia exhibited were unique. Hence we can, without making invidious comparisons, point out a few respects in which that province's Department of Mines is especially praiseworthy.

The Ontario exhibit was stronger, better arranged, and more complete than ever before. Alberta's exhibit sent from a longer distance than any other, was most attractive. But the mineral section was only part of a fine display of natural products.

The Quebec and New Brunswick exhibits were smaller than either Ontario's or Nova Scotia's. Both the first-mentioned provinces, however, had little time in which to get together a collection.

Nova Scotia's beautiful and striking collection of coal, gold ores, antimony, gypsum, and many other minerals representing the varied resources of our easternmost mining country, was most suitably housed. The exhibit is a permanent one. That is, it has been used at several expositions and is again to be used. But it is being constantly augmented by the addition of new specimens and improved by the replacement of old or broken specimens. From the Canadian National Exhibition it won two gold medals, one as an exhibit of economic minerals and one for its beautiful specimens of free-milling gold ores. Already it has a considerable collection of gold medals to its credit.

But the principal point to which we would allude is the fact that the N. S. Department of Mines is willing to go to the trouble and expense of preserving a permanent and portable mineral exhibit, in such form that it can, on a few days' notice, be sent to any quarter of the globe.

Such an exhibit is the most effective advertisement possible. It gives the public a complete view of the mineral possibilities of Nova Scotia. Its setting is so attractive that it compels attention.

Therefore, while Ontario especially, and Quebec, Alberta and New Brunswick generally, are to be commended for thier enterprise and liberality, it is due the Nova Scotian Department of Mines to say that they have set an example that should be followed by all our mining provinces.

The word "department" has a vague and impersonal sound. Behind departments there are live men. Accompanying this note is the photographs of the minister of Mines for Nova Scotia.

INAUGURAL ADDRESS.

By the President of the C. M. and M. Society of South Africa.

(R. G. Bevington, M.I.M.M., M.Am.I.M.E.).

I must first thank you for the honor which you have done me, and the confidence you have reposed in me in accepting me as your president for this coming year, and you may be sure that all I can do to further the interests of the Society will be done. I have been a member of the Society from its earliest days, and have its well-being and well-doing at heart. Prof. Yates has just joined, what he has termed the "Old Guard" of Past-Presidents, and I am sure you will all unhesitatingly agree with me that the Society is greatly indebted to him for the excellent manner in which he has carried out his duties during his term of office. The zeal and energy which has been displayed by your late Council in the carrying on of the business part of the work of the Society, and producing our valuable Journal, merits the highest praise, and I am very glad to see that it has pleased you to re-elect so many of its members to assist me during the coming year. Of the work of our Secretary, Mr. Fred. Rowland, one can only speak in terms of the highest commendation, and the Society is fortunate in possessing the services of one who is so keen in its interests.

It has been left to me by my predecessor to touch upon the work of the past year, the business aspect of which has been placed before you in your Council's Report.

With regard to the practical and scientific aspect, the members must have gained much knowledge from the number of instructive and interesting papers upon mining, milling, metallurgy, mine ventilation, stope drills, and so many other subjects which fall within the scope of the Society's work, which have been read before them. I am very pleased to see that we have had so many papers contributed by members in distant parts of the world, for that shows the hold which our Society has upon its members though far away, and the interest which they take in contributing papers upon subjects which they know will afford us food for reflection and healthy criticism, and I trust that the ensuing year will be as productive in this respect, and even more so.

The increase in mining members and the number of able papers on mining matters which have been given us has fully justified the course taken in adding the word "Mining" to the title of the Society. I feel sure that there are still many more mining men who will become members when they realize that the Society is not a closed one, but is open to all to whom the subjects dealt with are of sufficient interest to cause them to wish to join. It is through the interchange of views at our meetings, and in our Journal, that one's interest becomes carried into other branches of our work than that particular one with which one is perhaps specially occupied, and thus an incentive is given to learn more of the work being carried on by others and the difficulties which they have to contend with, which all tends to cultivate a broader and more tolerant frame of mind.

In reflecting upon the progress of mining and metallurgical work upon the Witwatersrand, having been associated with these fields from their very early days, it is most interesting to me to look upon the great advance which has been made in every branch of the industry. Magnificent headgears and huge hauling engines have taken the place of the old horse whims and whips which I remember. Large shafts carefully planned and proportioned to the work required of them have taken the place of open cuttings. Batteries of

hundreds of stamps of heavy weight have supplanted the 10 to 20 light stamp mills, and in doing all this, the best talent and scientific knowledge obtainable has been brought to bear, with a result of which all who have been engaged in the work must feel justly proud.

The advent of the cyanide process marked a point from which the greatest strides in the metallurgical part of our work have been made, and this process has afforded food for deep thought and research on the part of our chemists with the result that the whole method of application has been most carefully studied and worked out, but that is not saying that there is no opening for further improvements.

Chemical researches in the matter of strength of solutions employed, the combating of cyanicides, and the treatment of zinc to obtain better precipitation, have resulted in replacing the strong solutions which were at first deemed to be necessary, by what then seemed to be solutions of such little strength as to be useless. This, assisted of course, by reductions in manufacturers price, has resulted in greatly reducing the cost per ton treated, of what is still the largest item in the cost of treatment, viz., cyanide. Researches have proved that these weaker solutions are as effective and indeed more advantageous in that baser metals, which may be present in the ore, are less readily taken up by a weak than by a strong solution, and in this connection it may be remarked that the more rapid, and, at the same time, thorough, the treatment can be made, the less the amount of base metal which will pass into the solution.

Slimes, the making of which we at one time strove to avoid, are now almost welcomed, and the evolution of their treatment in a satisfactory manner has added enormously to the quantity of ore of low grade which may now be treated at a profit, so much so that rock is now being milled, and yielding a very handsome profit, having a less original content of gold than the assay value of tailings from the same class of ore which were refused by a cyaniding syndicate many years ago, as not being of sufficiently high value to be worth treating. One must not overlook the process for re-treating old tailing dumps, nor the fact that solutions very weak in cyanide, but holding minute quantities of gold and which at one time were looked upon as waste, are now passed through extractor boxes before final disposal, in order to endeavor to recover every grain which may be recoverable.

Turning to present practice. Milling work on the Rand seems to have settled down to a great uniformity of practice in the conducting of the general operations, though, of course, the question of greatly increasing the weight of stamps is occupying the attention of some of our leading metallurgists, and in this connection I would refer to the new mill of the Simmer Deep G. M. Co., the weight of the stamps in which will be 1,700 lb. In this case will also be put to the test the advisability of dividing up a large mill into separate units of 10 stamps, each unit being electrically driven. I cannot but think that this scheme will prove an undoubted success. As you will doubtless learn more about this, one of the newest plants on these fields, from another source, I will leave the matter to be dealt with by those more able to do so than myself.

Cyaniding, too, would appear to be conducted upon generally recognized lines in the carrying out of work, but still the energy of our members is always being devoted to the bringing out of some further improvements.

Slimes, which I have before referred to, as having been at one time looked upon as a bane and a bugbear, are now so successfully, and, one may say, so easily treated, that if the general grade of the ore on these fields are higher, it is quite a question whether the practice of all sliming would not be resorted to. In the near future I think we shall see some improvements made in the means for handling sands and slimes, so as to make plants less cumbersome and extensive, thereby reducing the initial cost of same, and it seems possible with the many improvements which are being made in slime filters that the decantation process may be superseded, or at least greatly assisted, by filters of the pressure or vacuum type in order that the slimes residues may pass out of the works deprived to the fullest extent of their content of soluble gold.

Tube milling, which on its introduction met with many objections, seems to have held its own and with very beneficial results upon the gold production and the lowering of the value of the final residues, but I would suggest that there is yet work to be done in discovering and defining the most suitable size and shape of the mill and the correct speed at which it shall be driven, also with regard to the diameter of the discharge outlet as governing to a certain extent the length of time which the pulp shall remain in the mill before making its exit therefrom. I am also inclined to think that a means should be provided for varying the number of revolutions, as the internal diameter becomes greater through the wearing of the lining, for it does not appear to be theoretically correct that what is the correct speed for one internal diameter is correct for a different diameter. The use of tube mills as secondary crushers, or rather grinders, has resulted in greatly increasing the duty per stamp owing to the possibility of using screening in the battery of larger mesh than would otherwise have been economically possible, and withal has reduced the value of the final residues.

In mining work there is always something new being done in the application of methods and overcoming the difficulties of getting the broken ore from the working places quickly to the surface. We are all looking to the near future to give us a handy stoping drill, and in this connection I would refer to the forthcoming stope drill competition. This competition will, I am sure, be most closely followed by mining men, not only here, but in all parts of the world. The benefit of the results to this community, provided that a reliable, light, efficient, and economical stoping drill, and one which will not be costly in repairs, can be found, will be immense, as it is the cost of mining which tells so much against many low grade propositions. The conditions and regulations for the trials appear to have been drawn up with the utmost care, and it is hardly conceivable that any question or contingency can arise under them which has been overlooked and not provided for. The composition of the committee, both as regards the members nominated by the Transvaal Government and those nominated by the Transvaal Chamber of Mines, is such as to inspire complete confidence in those who may be competitors, and also in the whole of the mining community and the public, who will await the findings and awards with the keenest interest.

The metallurgy of gold is simple compared with the problems which beset the metallurgist who engages in the work of dressing base metal ores and winning their contents. Our country is without doubt very highly

mineralized, and although not much has as yet been done in this direction, there will rise up in the future a large base metal industry, and one would, of course, wish to see the youth of South Africa in a position to take an active and leading part in such an industry. This it will not be able to do without having gained its knowledge in a practical and thorough manner, and this is the advantage which the Transvaal University College will offer in its new building, by means of ore dressing and metallurgical laboratories, and I counsel all those who desire to be able to take their due part in the development of the mineral resources and wealth of the country to lose no time in undergoing a thorough course of tuition in this excellent institution, under the direction of the able and energetic staff of professors which is associated with it. There is no place in up-to-date practice for the out-of-date worker. It is becoming more and more essential that a man should know both the theory and practice of his profession if he would compete with and rise above his fellow-men, and I venture to say that men who have had a good technical and practical training will be more and more in demand to the exclusion of the rule of thumb worker.

With regard to the ore dressing and metallurgical laboratories, there will, of course, be certain items of plant, models, etc., required beyond those which are now possessed, and it is to be hoped that money for this purpose will be unstintingly provided, in order to place the college in a position to compete with oversea mining schools. It is also to be hoped that the ore dressing plant there may be thrown open to all who may be competent to use it, and by this means assist prospectors, miners, the mining houses, etc., in short, be of benefit to the country generally. At present ore is being sent out of the country to be treated, but several small plants are now, or are about to be, erected in order to treat the ore on the spot.

That the base metal possibilities are receiving attention, and that the output from the various sources is growing, may be seen from the report of the Government Mining Engineer for the year ending June, 1907, wherein it will be found that in the year 1906-07 base metals were produced of an estimated value of over £90,000 as against £19,500 in 1905-06, and I trust that in the next report a further increase will be shown.

The fine new building of the Transvaal University College, over which your retiring president, Prof. Yates, was kind enough to conduct me recently, is nearing completion, and I understand it is the intention to provide rooms for the offices of the various technical societies. This, I consider, will be a very good thing, as it will bring us all together under one roof, and will, doubtless, lead to the establishment of a common room, open to the members of the various technical societies, where technical papers and the journals of similar societies all over the world will be on view, and such meetings of scientific men on a common plane will assuredly lead to that co-operation among scientists of every branch which is so desirable and necessary for the progress of science in general, and which should eventually make for that closer union of all the scientific societies in South Africa, which is so much to be desired.

(*To be continued.*)

DREDGING IN THE YUKON.

Abstract of article in the Mining and Scientific Press. By T. A. Rickard.

Frozen ground is generally supposed to be a fatal obstacle to the profitable dredging of gold-bearing gravel; it is usually assumed that all the alluvium of the Far North is in a perpetually frozen condition; in consequence, the opinion obtains even among well informed engineers that dredging in the Yukon is at best a costly experiment. The following data, recently gathered by personal observation, will be of interest to the profession and to others engaged in this branch of mining.

The first dredge to go to work in the Yukon was that of the Lewes River Mining & Dredging Co.* This machine was built to operate on the Cassiar bar of the Lewes river, a tributary of the Yukon, in 1899. In 1901 the dredge was moved to Claim No. 42 Below Discovery on Bonanza creek, and in 1903 up the creek to the Discovery group of claims. Last year the dredge was moved down to No. 6 and 7 Below Discovery, where it is now. On claim No. 42 the work was done on the basis of a 50 per cent. "lay," that is, the gross output was divided between the claim-holder and the dredging company, but in every other instance this dredge worked on ground belonging to its owners. This machine is now out of date, but it has given excellent service despite hard treatment. It was built by the Risdon Iron Works of San Francisco, and has 3¼ cu. ft buckets, open-connected, giving a capacity of 900 cu. yd per day. The of the Risdon type, that is, a bucket-conveyor, which the superintendent, Edward Simpson, says has not given a minute's trouble. For a short stacker of small capacity such as this, the bucket-conveyor is well adapted. The digging-depth reaches to 20 ft., that is, a maximum depth below water of 18 ft. About 4 ft. of bed-rock is removed, up to a maximum of 6 ft., as determined by panning the material brought up by the buckets. The dredge is operated by steam power obtained by burning 3 cords of wood per day, or 85 cords per month. The season averages 160 days. The dredge at the time of my visit was extracting 100 oz. gold, at $15.50 per oz., per day, so that the yield must average $1.70 per cubic yard.

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The ground is thawed artifically ahead of the dredge. It has been ascertained that the ground will keep warm for a month, so it pays to keep the thawing at least that much ahead of the digging. In any part of the creek that has been previously worked, as by drifts, accumulations of ice are found, due to seepage of water into voids and the effect of the ground-ice. In gravel that has not been molested the conditions are more favorable, for there the seasonal thaw will conquer the frost, if once the covering of moss be removed. The thawing was in progress just in front of the dredge, the steam-points being distributed at intervals of 4 by 8 ft. As the season progresses the interval is increased; at first, in April, it was 4 by 4 ft., and this was widened until by June 20, it had become 8 ft. one way and 4 ft. the

* At the present time there are 17 dredges at work in the Yukon Territory.

other. On July 17, the day of our visit, the seasonal thaw had softened the ground down to 7 ft., so that the points had that much less to do. The cost averages 12c. per cu. yd. In virgin ground an interval of 24 ft. for the points would be effective, but it does not pay to take chances wherever there are old workings, for the frozen pillars, topped by patches of moss, constitute the best of the gravel, and in old workings there is an agglomeration of gravel and "muck," with ice, making it imperative to thaw the whole mass. It is poor economy to take chances, for not only does the frozen ground imperil the dredge, but it prevents extraction of the gold. In virgin ground, after strippng the moss and mould, the natural thaw would reach to 14 ft. at the end of two seasons. The dredge has extracted about $700,000 in its various applications. By a life of seven years, that is, seven short seasons, and a probable further usefulness to the end of next summer, it has demonstrated what good service even one of the older and smaller machines wil give under adverse conditions.

The Canadian Klondike Co. commenced work on the Boyle Concession three years ago, and began dredging in August, 1905. This boat, built by the Marion Steam Shovel Co., has done most satisfactory work, considering that it was designed in 1904, since which date much has been learned concerning details of dredge construction. It is interesting to state that this dredge in the valley of the Klondike river is practically a counterpart of the "California No. 3," at Oroville, operated by the Oroville Dredging Co., although strengthened in parts, and with a better screen-arrangement. The record of the dredge on the Klondike is fully as good as that working under the supposedly more favorable conditions in California. In 1906, from May 9 to October 23, this dredge handled an average of 2,935 cubic yards per day; in 1907, from May 15 15 to October 9, this dredge dug 3,490 cubic yards per day. It is known that a good profit was made in both these seasons.

This dredge is the only one at work on the Boyle Concession, a tract covering 40 square miles, and extending for 6¼ miles along the Klondike, so as to cover from half a mile to one mile wide of alluvium. The gravel is 22 to 35 ft. deep, and bedrock is soft schist, so that the buckets dig into it to a depth of 4 ft. No artificial thawing methods are employed, the ground having been softened by the successive seasonal thaws, following the removal of the overburden of moss by freshets sweeping across the flat valley. A little frozen ground was struck near the edge of the channel, without damage to the dredge, and without benefit to the clean-up; the buckets cut into it and excavated it successfully, but the fragments of frozen gravel were not disintegrated in the screen, passing onto the tailing-pile without the extraction of any gold that they might have contained. With the exception of this incident, the frozen ground, which is such a bugaboo to dredge-masters in the North, has played no part in the record of this particular dredge.

It remains to add that the buckets are each of 7 cubic feet capacity, close-connected, so that the machine handles 3,900 to 4,00 cubic yards per day. Power is applied through the medium of electricity, generated by a 400-kw. Westinghouse generator, making 3,600 revolutions per minute direct-connected to a Parsons steam turbine. Wood at $7.75 per cord is burned in water-tube boilers, supplying steam at 165 lb. pressure.

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The Yukon Gold Company will have seven dredges in operation before the close of the present season. The three dredges first built had buckets of 5 cu. ft. capacity. The four new dredges, of which two are completed, and two are nearly finished, have buckets of 7 cu. ft. capacity, and they have been designed to fit local conditions. On July 15 I visited one of these larger dredges, namely, that known as No. 6, on Bonanza Creek, at 90 Below Discovery.

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Dredge No. 6 of the Yukon Gold Company is an up-to-date machine of the most approved design and built by the Bucyrus Company, of South Milwaukee. Going aboard the dredge, it is noted that the buckets have lugs designed to transmit the digging-stress from the lips to the base, and to relieve the rivets from excessive strain. Mr. E. E. McCarthy, the dredge superintendent, informed me that the lips of the bucket were made of Manard manganese steel, the base of chrome-nickel steel, and the hood of cast-steel. Each bucket has a capacity of 7 cu. ft., and as the speed over the tumbler is at the rate of 23 buckets per minute, the capacity of the dredge is from 90,000 to 125,000 cu. yd. per month, depending upon conditions. These conditions include, more particularly, the depth of the gravel, the character of the deposit, and the amount of bed-rock excavated.

* * * * * *

Every part of the dredge is of the most approved construction, for the length of the season in the Yukon country is so short as to make experiments inadvisable. The choice of design is the outcome of wide experience in this branch of mining on the part of O. B. Perry, the general manager of the Yukon Gold Company, and it represents the best type of machine now at work in the North.

A part from economic conditions, which vary all over the world, the distinctive feature of dredging practice on the Yukon is the necessity for overcoming the frozen condition of the ground. This a geologic frost as distinguished from the seasonal frost.

The seasonal frost, as measured on ground that has been thawed in summer, ranges from 3 to 5 ft., but the geologic frost extends to a depth of 230 ft., if not more, wherever the ground is wet, as in valley-bottoms. On the other hand, the warmth of the short summer, lasting 4 to 4½ months, will thaw the ground to a depth of 4 to 7 ft., according to local conditions, the chief of which is the nature of the surface-covering. In two seasons the frost in a gravel deposit may be conquered by the seasonal thaw to a depth of 10 to 22 feet.

The Northland is covered by a blanket of moss and loam due to the decay of vegetation. This overburden is called "muck" by the miners because when it melts it runs like thin mud, for it is composed of 24 to 40 per cent. organic matter and 60 to 70 per cent. ice. When either the summer sun or artificial heat strikes this black blanket, it disintegrates and is readily floated on the running stream. Being a mixture of organic matter and ice, it makes a perfect insulator against heat and protects the underlying frozen ground from the warm air of summer. The thickness of this frozen muck varies from a few inches to 40 ft., the maximum being in gullies where it has accumulated by sliding from adjoining hillsides. Two feet is an average thickness.

It is obvious that before the seasonal thaw can become effective, the blanket of moss must be removed. This is done naturally by freshets and by meandering streams; it has been done in a general way as an incident in ordinary mining operations along the creeks, and it will be done systematically both by ground-sluicing and also, much more rapidly, by hydraulicking. Where time is not an immediate factor and where bed-rock is not more

than 15 ft. deep, a gravel deposit can be thawed to bed-rock in two seasons by simply removing the cover of moss and loam so that the summer heat may get an opportunity to penetrate. But, on the other hand, where dredging operations cannot wait for such a slow method, or bed-rock is deeper than 15 ft. or where old workings exist, it becomes necessary both to accelerate and to perfect the thawing process by the aid of artificial methods. This is done by the application of steam.

By introducing steam into the frozen ground, the ice is melted; the more water (that is, ice) there is in the gravel, the more steam will be consumed in converting water from its solid to its liquid state. Ice is a non-conductor; rock is relatively a good conductor; therefore, the less water the gravel contains, the more easily it is thawed. The stones retain the heat imparted to them so as to radiate it slowly into the surrounding mass.

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Thawing the frozen ground is a temporary procedure. As soon as sufficient water is made available by the completion of a main ditch-system, it is intended to strip the covering of moss by the use of water under high pressure. The ditch and pipe-line of the Yukon Gold Company is now approaching completion, and the water will be ready for stripping early next season. Thawing will be discarded at the close of next season, except in isolated spots where the water cannot be used advantageously. The method of using water in preparing the ground for dredging will be as follows: First, sotck-lines will be laid along the edge of the creek carrying water under high pressure, tapped from the main trunk line. The moss and muck will be stripped by "piping" (that is, the use of a large volume of water under pressure), driving from both sides to a longitudinal cut, down the centre of the claims. See Fig. 1. This work will be carried forward about two miles ahead of the dredges. When the ground has been stripped, the water will again be applied (at the lower end first), so as to cross-cut the gravel with trenches at intervals of from 20 to 50 ft. The effect of this exposure of faces of gravel to the air is to accelerate the natural thaw. After the cross-trenches have been made, the longitudinal trench will be deepened so as to drain the entire area. The depth of the trenches, and th extent to which this work is carried, will depend upon the depth to bed-rock and the rate of thaw. See Fig. 2 and 3. Experience thus far indicates that when the stripping has been completed, not much trenching is necessary to carry the thaw to bed-rock when the gravel is not more than 18 or 20 ft. deep. Each successive season will extend the thaw farther, so that the depth and amount of trenching will depend upon the nearness of the dredge. By this method, the total cost of preparing the ground for dredging should not exceed 5c per cu. yd., for there is no installation and maintenance of sluices, and many of the other expenditures incidental to hypradulic mining are lacking. The actual work of mining is done by the dredge; the amount of ground moved in the preliminary operation being small, compared to the yardage dug subsequently by the dredge itself. By thus making the most of the natural thaw, and preparing the ground for rapid dredging, the total cost of mining the gravel should not average more than 20 to 25c per cu. yd. The result obtained with artificial thawing in advance of dredging actually shows a cost of 19 to 35c per yd. The more the natural thaw is used to fight the natural frost, the smaller the expense will be, and the less the final cost of operation.

As a matter of interest, the following data concerning the operations of the No. 6 dredge may be quoted: The width of dredgeable ground, reaching from claim No. 88 Below Discovery on Bonanza Creek to No. 104, ranges from 500 to 1,300 ft. The depth to bed-rock averages 16.7 ft. The bed-rock itself is sericite-schist, with quartz stringers, decomposed so as to be dredgeable to 4 or 5 ft. deep. The gravel is small; immediately above bed-rock, where the stones are largest, the size is rarely over 6 in., with a few boulders that attain a weight of 100 lb. apiece. The length of campaign here is one-third of a year, and the dredge is expected to be in service for a period 1½ times as long as in California, that is, the actual working time is one-half that of a dredge working at Oroville. Depreciation in the Yukon is based on a service of 12 seasons, equivalent to 5 years of actual operation; in California it is 10 years.

During the 22 days of July that had elapsed up to the date of this writing, the No. 6 dredge had dug 51,952 cu. yd., from the start of the work. The total cost was $11,728; the total yield was 2,718.48 oz. gold, worth $44,281; the operating profit was $32,553. In the costs are included $1,443 for labor, $50 for repairs, $190 for supplies, $1,500 for depreciation, $1,752 for selling charges (including also tax, express and treatment) on the gold. Power cost, $1,500, this being based on 300 hours at an average load of 200 kw. hr., or 60,000 kw., at 2.51c per hour. Thowing to the amount of 4,086 sq. yd. cost $4,168. Repairs and supplies are low as compared to an average operation. If this item is increased by $1,500 to $1,800 per month for the season, the extra cost would be, say, 2½c per yard. The allowance for repairs and depreciation together is then $3,500 to $4,000 per month.

It is noted that the thawing by steam-points covered 4,086 sq. yd. of bed-rock at a cost of $4,168, to which must be added the preliminary sluicing-cost of $800. Of the total yardage dug by the dredge, only 56 per cent. required artificial thawing; in consequence, the net cost of thawing was only 9½c per cubic yard dredged.

The work of the 22 days showed a return of 85.3c per cubic yard; the cost was 22.6c, and the gain 62.7c. Adding 2.5c more for repairs, the cost becomes 25.1 and the profit 60.2 cents per cubic yard. It is interesting to state that the estimate based on the examination of this ground was 60 cents gross per yard. The actual return thus far affords an encouraging result; for the cost is as estimated, while the profit is greater. It must be remembered that the No. 6 dredge is a new machine, just put into operation. As the season progresses, the capacity will be increased; it ought to be at least 80,000 cu. yd. per month, as against the rate of 70,000 recorded for the period reviewed. At Oroville, dredges of the same type are digging from 120,000 to 150,000 cu. yd. per month in ground yielding 12c. per yard at a cost of 5c per yard.

At the present time the Yukon Gold Company has five dredges in operation and two more nearly ready to start. The economic results so far this season are uniformly good, and compare favorably with the original estimates. Difficulties due to frozen ground are almost negligible; the troubles that proved so annoying last year were due chiefly to inadepate equipment. While some artificial thawing by steam will always be necessary, in spots, and while such thawing is costly, the proportion of ground requiring the use of steam-points will be steadily reduced. The application of water under pressure, as already described, will become an important factor in diminishing the expense of preparing ground for dredging. On the whole, it is apparent that frozen ground is not the terror it has been represented to be, on the basis of the first experience with dredging in this region.

The Canadian Klondyke dredge showed a seasonal cost last year of 16½c. per cubic yard, digging ground

that needed no artificial thawing. I am informed, on good local authority, that the Bonanza Basin dredge, at the mouth of the Klondike River, is now doing well, in rich ground. The dredge at the mouth of the Forty Mile River, belonging to the Consolidated Gold Dredging Company of Alaska, is also said to be working at a profit. The Yukon Gold Company's dredges are working at a total cost, including thawing, of 19 to 35c, and the expense will be reduced next season to an average of, say, 20 cents. The gravel is rich and patchy, as rich gravel always is; but there is every reason to believe that some of the claims on Hunker and Bonanza Creeks will give yields constituting a new record in this branch of mining.

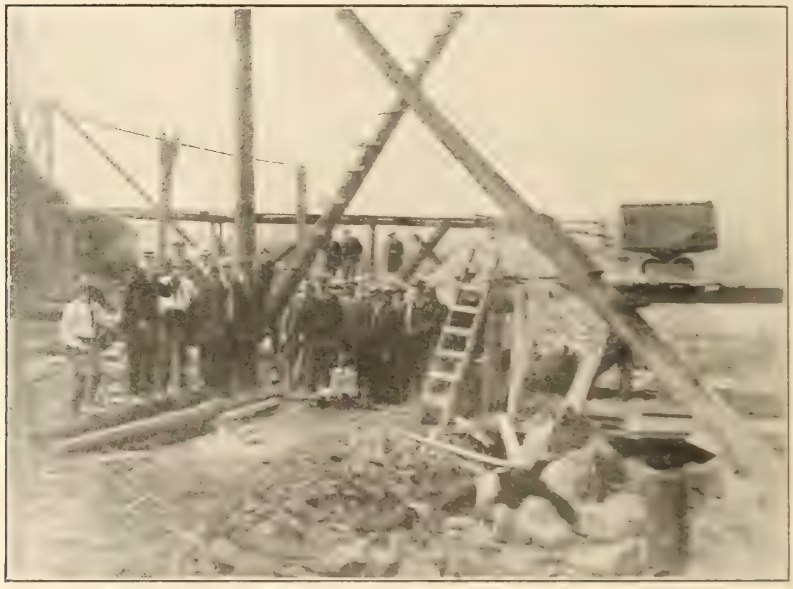
On the whole, the prospects for dredging in this region are vastly better than they were a couple of years ago. Where failures have been made, they were due mainly to light machinry of inferior design, hindered by inadequate equipment, rather than the poverty of the ground or natural obstacles to mining operations.

COBALT VISIT OF C. M. I. EXCURSION.

The Reception Committee of the Cobalt Branch of the C. M. I. was as follows: M. T. Culbert, O'Brien Mine; E. L. Fraleck, Cobalt Lake Mine; R. W. Brigstock, Drummond Mine; T. Jones, Buffalo Mine; R. P. Rogers, Coniagas Mine; G. McNaughton, Trethewey Mine; S. H. Logan, manager Canadian Bank of Commerce; Hugh Park, Nipissing Mine; D. B. Rochester, Cobalt Lake; R. A. Bryce, Silver Queen; Arthur A. Cole, T. N. O. Ry., chairman.

Before arrival at Cobalt the party was divided into foud groups, and on arrival each group was taken charge of by two guides.

During the morning (Sept. 5) the following mines were visited: Buffalo, Cobalt Lake, Coniagas, La Rose, Nipissing, Right of Way. The following mills were also visited: Buffalo, Coniagas, Muggley.



Mining Engineers at Crown Reserve.

Luncheon was provided for the party by the following mines: Coniagas, La Rose, Nipissing, Right of Way.

In the afternoon the private train was run out to the end of the Kerr Lake branch, and the following mines were visited: Lawson, Crown Reserve and Kerr Lake. The fine collection of native silver from the Nova Scotia had been brought over and was on exhibition at the Kerr Lake Mine.



Canadian and British Mining Engineers' Train at Cobalt.

Train was taken at 6 p.m. and the party run north, where they were entertained by the towns of New Liskeard and Haileybury.

Sunday morning (Sept. 6th) the train was run down to Temagami, where the Belle of Temagami was awaiting the party. A pleasant run up the lake to Temagami Inn, where luncheon was provided, compelted the morning. After having a look at the Hudson's Bay post at Bear Island, an early return was made to TemagamiS tation. Mr. T. B. Caldwell conducted the party over his Iron Range, and at 6.30 the train pulled out for Sudbury.

The Cobalt Reception Committee presented each guest with a souvenir, which consisted of a small disc of refined metallic cobalt, on which was enamelled the word Cobalt, fixed to a nugget of native silver. The metallic cobalt was presented to the committee by the Orford Copper Company of New York. Besides this each foreign society which was officially represented was presented with a collection of rocks and ores of the Cobalt district. Chairman A. A. Cole, who was responsible for this idea, has got together a number of these collections. They are valuable aids in the study of the district.



ANOTHER VIEW OF THE GROUP.

Rocks and Ores of the Cobalt District

ONTARIO, CANADA

ROCKS		
Niagara.	1	Limestone
Diabase Series	2.	Diabase
	3.	Diabase. With red feldspar
	4.	Gabbro
Middle Huronian.	5.	Quartzite. Sea green
	6.	Arkose
	7	Breccia
Lower Huronian.	8.	Slate. Red banded
	9.	Conglomerate
	10	Slate. Intermediate
	11	Greywacke
	12.	Quartzite
	13	Slate. Basal.
Laurentian.	14	Granite
Keewatin.	15	Greenstone.
	16	do (Diabase)
	17	Pyroxenite
	18	Lamprophyre
	19.	Quartz Porphyry.
	20.	Graphitic Shale
ORES.	21.	Native Silver.
	22.	Silver Ore.
	23.	Smaltite.
	24.	Niccolite
	25.	Cobaltite.
	26.	Cobalt Bloom.
	27	Nickel Bloom.
	28.	Vein with rock attached, Calcite.
	29	do do Smaltite.
	30	Wall rock with native silver.
	31.	Argentite.

Set No.

PRESENTED BY THE

COBALT BRANCH

Canadian Mining Institute

To

September 5th, 1908

BOOK REVIEWS.

Genesis of Metallic Ores and of the Rocks which enclose them—by Brenton Symons, F.C.S., etc. 494 +XXXIII. pages. 154 illustrations. Price 7s. 6d. net. Published by "The Mining Journal," 46 Queen Victoria Street, London, E.C., 1908.

Technical treatises, professional text-books, brochures, monographs, reports, and theses are usually read under compulsion. The student in his salad days has before him the soul-searching examination. The mine manager or the consulting engineer is forced by the competition of his fellows to keep abreast of the times. The book reviewer (an odious beast at best) must earn his stipend.

It may then be postulated that few technical or scientific books are perused for refreshment or recreation. Consequently, or conversely, it is unusual to find books of this sort that are in and of themselves refreshing. Mr. Symons' "Genesis of Rocks and Ores" is refreshingly readable, and, therefore, unusual.

Mr. Symons' object has been to clothe his chosen topic with interest; to avoid superfluous technicalities; and to give the public a book that it can and will read. Considering the volume from this point of view it is vastly more approachable than the polysyllabic patter of our arch-enemy, the modern geologist. In fact Mr. Symons' book is suspiciously easy to understand., therefore he will merit the displeasure of those gentlemen whose function in life is the interdifferentiation of innocent magmas, the contortion of unsuspecting anticlines, or the erosion of unoffending landscapes.

"Genesis of Rocks and Ores" is divided into three books as follows: Book I., Sedimentation of Rocks and Ores; Book II., Metamorphism of Strata; Book III., Segregation of Metallic Ores in Veins. Each book is subdivided in careful and logical sequence. From examination of the table of contents it is seen that the author considers his subject as an organic whole with articulated branches, rather than as a disjointed assemblage of incompletely related phenomena.

Therefore the reader is carried naturally and easily from chapter to chapter and from book to book, for Mr. Symons possesses an exceptionally fluent style and has at his disposal a comprehensive vocabulary. Nor is his style devoid of charm. On the contrary, there are passages that are unquestionably graceful, powerful and lucid.

At pleasing intervals there are liquid inclusions of verse, which neither detract from the appearance nor impair the value of the work.

Lest we be tempted into unprofitable discursiveness, we wish to conclude with hearty approval of Mr. Symons' attempt to popularize a difficult and complicated department of science. The book is written by one whose whole heart is in his work.

The result is what one might expect—a book that shows every evidence of careful workmanship, profound erudition, sound judgment, and good taste.

We do not hesitate to recommend the "Genesis of Metallic Ores" to the mining fraternity in particular and to the reading public in general.

The Miners' Pocket Book—A reference book for engineers and others engaged in metalliferous mining—by C. G. Warnford-Lock, M. Inst. M. M., F.G.S. Fifth edition. Entirely rewritten. Numerous illustrations. 624 pages...Price 10s. 6d. E. & F. N. Spon, Limited, 57 Haymarket, London, 1908.

As the author explains in his introduction, the professional mining man is constantly confronted with difficulties. He can carry with him no reference library. He must, in most instances, rely upon his own unaided judgment. Many pocket reference books have been published to aid the engineer in the field and to supply otherwise inaccessible data. Only long experience can indicate just what material should be included in such volumes and what omitted.

Mr. Lock's "Miners' Pocket Book" has entered upon its fifth edition. It has been completely rewritten. Numerous deletions have been made, and much has been added.

The question of suitable field-books is one of paramount importance to the mining engineer and to the prospector. We therefore think it not out of place to present a rough view of the contents of this particular pocket book, and to examine more critically one or two of the sections into which it is divided.

Beginning with a section on power, in which comparative costs of all varieties of power are given, power transmission, weights and measures, prospecting, mine surveying, drilling, blasting, shaft-sinking, developing, mining methods, hauling and hoisting, unwatering, ventilation, sanitation, lighting, signalling, aid in mining accidents, are successively disposed of. A substantial group of tables for the identification of minerals, a list of useful books and a glassary, complete the volumne.

The illustrations, type, and paper are good. The cover is strong and durable, an important consideration in pocket books.

Naturally, as one of the most important divisions of the hand-book is that in which prospecting is described. Rough estimates are given of the expense per acre, etc., of clearing land. The methods of exploring superficial and deep deposits are outlined, and an excellent summary of diamond drill practice is included. The calyx drill is not touched upon. The crude Australian "dolly," or home-made prospecting stamp, is described, but no reference is made to the many excellent types of prospecting stamps manufactured on this side of the Atlantic. Indeed, although prospecting is taken up in a practical manner, yet the author's treatment of the subject is scant. Much material that is essential to the beginner is omitted.

In contrast to the section on prospecting, those devoted to mine surveying, drilling, blasting, shaft-sinking, trenching, etc., are up-to-date, lucid and comprehensive. Such modern developments as square-set timbering are given due prominence in the text and by means of diagrams. A short explanation of the uses of underhand stoping is one of the best passages in the book. In short, those parts of the volume that have to do with actual mining operations are most creditable. But they are, as is inevitable with English publications, tinged strongly with the methods and terminology of English mining districts along with Australian and South African modifications. Sometimes the charge of provincialism could be preferred with justice.

The chapter on "Fellow Aid in Mining Accidents," a most decidedly instructive addition to the volume, lends especial value to the hand-book It is brief, but

well calculated to help the prospector or miner out of otherwise serious contingencies.

These random remarks do justice neither to the incidental shortcomings nor to the outstanding excellence of "The Miners' Pocket Book." It may be but fair to sum up our impressions by saying that Mr. Lock's sins of omission do not affect the volume seriously. On the other hand, the book has in it a great deal of mining information that the mining engineer cannot carry in his head, and much, also, that he is supposed to carry but usually does not. Imperfections will exist in books as long as they persist in mankind. Mr. Lock's book is not perfect; but it is, by long odds, the most useful pocket book that we have seen for some time.

Cyanide Processes. By E. B. Wilson, E.M. Fourth Edition, revised and enlarged. 12 mo., cloth $1.50, 249 pages. John Wiley & Sons, New York.

Like a widower that has survived three wives and has consummated a fourth matrimonial arrangement, a book that sees four editions must have solid virtues.

The scope of cyaniding has widened tremendously since the first edition of Mr. Wilson's book was published. Its application is yet by no means universal. The fact that the limitations of the process are now more exactly known has eliminated many costly blunders.

The most marked feature of recent practice is the successful treatment of slime by means of filter-presses, distributors, agitators, and decantation. This topic Mr. Wilson treats in a new chapter, the longest in the volume.

No superfluous matter is included in "Cyanide Processes." Mr. Wilson has eschewed the customary device, to which authors not infrequently resort, of padding their text with extracts and details of construction from manufacturers' catalogues. He wisely leaves all details of plant construction to the discretion of the engineer and millwright.

The practice of cyaniding, the chemical and mechanical principles involved, the essentials of the subject, Mr. Wilson sketches admirably.

"Cyanide Processes," carefully read, will give the novice a working conception of this most important branch of metallurgy. The maturer expert will also find much that is suggestive and helpful.

Typographically, the book deserves equal praise. The half-tones and diagrams that elucidate the text are well chosen and clearly printed. The type is large and easy.

Compressed Air Plant for Mines. The Production, Transmission and Use of Compressed Air, With Special Reference to Mine Service. By Robert Peele, Professor of Mining in the School of Mines, Columbia University. First edition, 8 vo., 325 pages. Illustrated with plates, diagrams, half-tones and wood cuts. Price $3.00. John Wiley & Sons, 43 and 45 East 19th Street, New York, 1908.

The author, while laying no claim to presenting new facts, has gathered together a great deal that is both practical and serviceable concerning the use of compressed air. Every year, every week indeed, there are pages of interesting and often useful matter appearing in current technical journals. Much of this material is lost or forgotten in course of time. Mr. Peele has evidently followed his subject closely. He has extracted from the periodicals whatever has appealed to him as of sufficient importance. This material, together with his own intimate knowledge of modern practice, has enabled him to put together a book that is practical and instructive.

The first chapter traces the development of air compressors, and indicates the advantages of compressed air transmission of power over steam transmission. We will be pardoned for reproducing a few sentences from the first paragraph of the book, dealing with the history of the rock drill. "The first percussion rock drill, operating independently of gravity, was invented in 1849 by J. J. Couch, of Philadelphia. . . . Couch's machine, together with its immediate successors, such as the Fowle drill (1849-51) and the Cave (Paris, 1851), were steam driven, and therefore unsuitable for underground work. In 1852, the physicist Colladon proposed the use of compressed air for operating rock drills, in connection with the driving of the Mount Cenis tunnel. His idea was developed . . . between 1852 and 1860, and in 1861-62 an air-compressor plant was first used successfully at that tunnel. It was driven by water-power, and furnished air for ventilation as well as for the drills."

Straight-line, duplex, compound steam end, stage, direct and belt driven or geared compressors are described and compared in Chapter II. In Chapter III. the theory of air compression is outlined. Wet compressors, dry compressors, comparison of the two, compound or stage compressors, air inlet valves, delivery valves, performance of air compressors, air receivers, speed and pressure regulators, air compression at altitudes above sea level, air compression by direct action of falling water, are some of the subjects attacked in Part I.

Part II. is taken up with transmission and use of compressed air. The rules governing the economic conveyance of compressed air in pipes are enunciated and explained. Compressed-air engines are dealt with. In a clear and succinct manner freezing and its prevention are thoroughly discussed. The philosophy of reheating is the subject of an entire chapter. The four remaining chapters are devoted to rock drills, compressed-air pumps, pumping by direct action of compressed air, compressed-air haulage for mines.

Mr. Peele's volume is, in our opinion, exactly suited to the needs of the mine manager. This is tantamount to saying that it is a strong, well-balanced, usable book.

PERSONAL.

Professor M. B. Baker, School of Mining, Kingston, has returned from Lake Abitibi.

Mr. O. Simonis, of Henry Simonis & Co., London, Eng., spent September 21 and 22 in Toronto.

Mr. N. E. Isbell, a mining expert of Goldfield, Nev., has been making an examination of the Paymaster Gold Mine, Manitou Lake.

Prof. George R. Mickle, of the faculty of Applied Science, Toronto University, has accepted a position in the Ontario Bureau of Mines.

Mr. H. W. Scattergood, of Philadelphia, Pa., owner of the Little Master Gold Mine, Manitou Lake District, visited the property recently.

President Maurice Wendall, of the Northern Pyrites Company, has returned to New York after a visit of inspection to the company's property at Vermilion Lake, Ont.

EXCHANGES.

Engineering and Mining Journal, September 19, 1908. —Mr. Arthur R. Townsend writes on "Official Reports of Costs of Producing Copper." Remarking first upon the paucity of information as to capital, expenditure, etc., he dwells upon the diversity in arrangement of reports. "The cost per pound of copper, as has been noted above, is derived by dividing the total costs, less the income from other sources, by the total pounds of refined copper produced." Running over the costs of various Canadian and American companies, we note that copper was produced in 1906 at the following figures per ton.

	1906. $
Dominion Copper	0.174
Granby	0.133
Greene Con.	0.130
North Butte	0.07
Tennessee	0.107
Utah Con.	0.042

In the Lake Superior country costs per pound range from 24.62 cents to 6.76 cents.

The Iron and Coal Trades Review, Septemb r4, 1908. "The Coal Dust Question" is the title of a leading editorial in the Review of this date. Experiments have demonstrated that a dense cloud of coal dust is not required to initiate an explosion. One pound of dust per lineal foot is sufficient to supply material for a disaster. Four recent explosions have resulted from the use of permitted explosives. In all these cases some percentage of inflammable gas was present. Why was its presence not discovered by the firemen, whose duty it was to ascertain whether firedamp was or was not present? Defective eyesight, our contemporary states, may be one of the prime causes of this omission. A fireman should be able to detect easily a 3 per cent. firedamp cap. This requirement is in vogue in British Columbia.

CORRESPONDENCE.

To the Editor Canadian Mining Journal:

Dear Sir,—While I am pleased to note that Mr. Willmott has found leisure to reply to my criticism of his paper on "The Origin of Deposits of Pyrites," I, at the same time, regret that he has made no statement regarding the correctness of my criticism upon his paper on "The Iron Ore Deposits of Ontario." Instead of replying to this himself, he says that he will leave this task to Prof. Leith. For my own part, I do not consider it to be the part of a fearless combatant to send his friends into the firing line, and I am positive that Prof. Leith will not assume the work of answering me, because, from my intimate knowledge of him, I believe that he will gracefully accept the correction of a lapsus which admittedly has occurred. "Errare humanum est." Had Mr. Willmott's charity taken this adage into fuller consideration, he would not have been betrayed into a display of feeling which the occasion did not warrant. An old German saying would characterize such an outburst very tersely, but I shall not run the risk of falling into the very error that I have just been deploring.

In the following sentences Mr. Willmott has seen fit to admonish me: "Mr. Hille has done me the doubtful honor of reading my paper so carelessly as to be unacquainted with its contents." And again: "Criticisms of such papers are welcomed by the institute, and by the writers, and if more written ones were made the institute's journal would gain in value. Such criticism, however, should be of the facts given, or of the inferences drawn, and here Mr. Hille lamentably fails."

In reply to Mr. Willmott's first retort I may say that his claim that I had read his paper carelessly, and, in consequence, was unacquainted with its contents, can only have been adduced by him in the hope of weakening thereby my correction as regards his determinations of some of the Thunder Bay iron and pyrrhotite deposits, in which such gross errors apepared. This he emphasizes by my remarks: "Mr. Willmott attributes the origin of a large number of pyrite deposits to sedimentation, and refers for support to Beck, Kemp and others." I will now admit that I ought not to have shown so much charity, but that it would have been better had I expressed myself still more plainly and exposed the quoting of these observers in its right light. But I may here ask what earthly good is served by the citation of "current opinions," if they are not shared by either the authors or even by Mr. Willmott himself? They should merely have been cited for the purpose of drawing attention to the hypotheses of others which were incidentally enumerated by the later writers. Had they been discussing the same deposits which were treated of by Mr. Willmott, the case might have been different, but the citation of the theories of others concerning occurrences of pyrites, that are, perhaps, totally dissimilar, carries little, if any, weight. In our consideration of the origin of ore deposits, it is impossible to apply the same rule to each individual instance, although it might be reasonable, in considering certain periods, to admit the existence of a certain fundamental law, and then, if our personal experience is sufficiently wide in this respect, we are entitled to speak with more confidence in the matter, but if this is not the case, it is then dangerous to make too free comparisons between our own investigations and those of others. I imagine that the grounds for such confidence were somewhat deficient in the case before us, otherwise Mr. Willmott would have given us the benefit of a fuller explanation as to the origin of these solutions carrying sulphide of iron. Did the meteoric water dissolve pre-existing pyrite deposits, or did volcanic mineral springs containing such salts in solution overflow their vents, carrying them into the depressions of which he speaks. Moreover, would not deposits formed in this manner, although produced under widely different conditions, which presuppose phenomena that I might say are diametrically opposed to each other, both be classed as sedimentary deposits? Has Mr. Willmott given us a clue by which we may learn to which of these sedimentation processes he attributes the existence of the pyrites deposits? Only from one sentence we might be led to the conclusion that he believes meteoric waters to have been the vehicle which carried in the iron and sulphur salts, but again he says: "How the silica, iron and sulphur were dissolved and precipitated is not absolutely clear. Presumably, the iron was partly transported as a carbonate and partly as a sulphate." Here we observe what difficulties Mr Willmott has placed in his own way for considering the dissolution of these minerals by meteoric water, if that process was what he had in view. We find the same indecision not only in his paper, but also in a report to the Bureau of Mines for 1902, on the Michipicoten Iron

Region, in which he was a co-worker with Dr. Coleman. On page 162, a volcanic origin is indicated for these iron-bearing rocks, as expressed in the following words: "The source of the iron must be sought for perhaps in some of the basic eruptives of the series, if it is not looked on as a direct sediment, perhaps of a chemical nature, on the sea-bottom of the time." Also on page 170, under the heading, "Genesis of the Iron-bearing Rocks," a volcanic activity was spoken of, in the intervals of which the iron-bearing rocks, consisting of carbonate and sulphide of iron, were supposed to be laid down. It would doubtless have tendered more to the enlightenment of all parties concerned, if Mr. Willmott had informed us of the source from whence these solutions had been derived. He speaks of the existence of volcanoes at that period, which poured forth lava and ashes, doing so at repeated intervals, between which occurred the precipitation of various iron salts among those volcanic products. If it is implied that it was meteoric waters that brought these iron salts to those particular spots, I fail to comprehend where or how they managed to dissolve pre-existing pyrite deposits, because the overflowing lava and falling ashes and tuffs would have not only destroyed the permeability of the older rocks, but also destroyed their gossan, which might have accumulated upon them. Or, are we to understand that the solutions came from greater distances, overflowed these volcanic extravasations, and were relieved by them of their contents? If so, how can we account for the fact that oxygen did not act upon the iron in solution, precipitating it in the form of an hydro-ferric oxide long before it reached its supposed destination? Again, lava streams and ashes are usually understood to be mountain-building materials, and yet are we expected to believe that these solutions would flow uphill and nestle down into the rugged clefts and chasms such as are usually the features of the surface of lava streams? Yet further, I believe that it is almost universally conceded by geologists that the Keewatin rocks formed the first crust of our globe, by which is understood that first crust of which remnants have been preserved to us, and the rocks constituting this crust have been produced partly by the consolidation of the fluid, fiery constituents of the earth's earliest magma, and partly by a magma that became eruptive, broke through the former crust, and solidified thereon. We have further to take into consideration that the heat existing at that time, and radiating forth, from and through the cracks and fissures of these rocks must have been so intense that meteoric waters can have played only a very subordinate part in the deposition of minerals. We must, therefore, turn our attention to a much later period when the crust of our earth had attained such a thickness as to keep the subterranean heat confined to a far lower region.

Now the inference that must be drawn from the above considerations is that neither the pyrites nor the carbonate of iron deposits can be of Keewatin age, as claimed by Mr. Willmott. Of all the countries on our whole globe I do not think that there exists any locality in which the Keewatin rocks are so plainly observable as in the western part of our own province: further, there are very few portions of it which, in the course of my twenty years' residence here, I have not visited, and if it be not "contre etiquette" I might make an even stronger boast than that, that nature has favored me with a keen sense of observation, which has rarely played me false. Now I may say, that in all my experience I cannot recall one single case where an ore deposit found in the Keewatin could be termed a syngenetic product, but I have seen hundreds and hundreds of ore deposits in the same rocks which are epigenetic, that is, subsequently introduced. In support of his theory, Mr. Willmott quotes Van Hise, Leith, Coleman, Merriam and others, and he also compares and reproduces in the Bureau of Mines Report for 1902, pages 174 and 175, with two illustrations from Van Hise's report on the Vermillion Iron Range, that is to say on the Chandler Mine, with which he considers the Michipicoten to be analogous. Van Hise indeed does classify the Vermilion and Sudan formation under the head of Archaean, and consequently Mr. Willmott will classify them under the Keewatin. Now the greenstone in which the Chandler Mine rests is neither an Archaean, nor, what in my opinion is the same, a Keewatin rock, but it is an intrusive greenstone dyke, breaking through the Keewatin and the sedimentary rocks of the Sudan iron formation, and it is therefore a much younger rock. Further, the Vermilion iron-bearing rock formation is considered to be the same as that of the Mattawin and Hunter's Island; if so, then it is not of Keewatin age, but of the same age as the Amimikie. The fact that these iron-bearing rocks are found resting in the fissures of the Keewatin schists by no means implies that they are of the same age as the latter. The jaspers, ferruginous cherts, siderites, magnetites, martites and hematites of the Mattawin, Hunter's Island and elsewhere are identical in composition, structure and in origin with the Animikie, with this only difference, that, through local phenomena, the one is changed into magnetite and hematite, while the other has undergone less change, having partly retained the original structure, or having been changed only locally into hematite, and further the process of deposition was in the one case obstructed and in the other not. To explain this in other words: the plutonic springs, carrying the silica and iron in solution, overflowed their vents and deposited their contents unobstructedly into the depression of the Laurentian or Keewatin rocks, and these we recognize to-day as the Animikie: in the other case the flow of the solutions was partly obstructed by overlying rocks and they were compelled to seek an entrance into the larger and smaller fissures of the Keewatin. Of this fact we have ample field evidence, such as to leave the matter not in the slightest doubt.

In the foregoing argument I have endeavored to establish (1) that the iron ore deposits situated in the Keewatin rocks are not of Keewatin age, and (2), that consequently the Michipicoten pyrites, which Mr. Willmott thinks are so closely connected with the former, are also not of that age. He asks me to explain why this is the case.

If Mr. Willmott had studied what he calls the Keewatin iron ore deposits somewhat more closely, he would have discovered, (1) that, as I have explained above, they are not of Keewatin age, and (2), that they are not associated with pyrite deposits of the same age, and (3), that, whenever it so happens that sulphide of iron deposits occur in the neighborhood, the occurrence is accidental, because eruptions of greenstones, which were the originator of the pyrites, occurred all over the country, and, if a more precise definition is required as to the time at which this occurred, it must have been, as I have formerly stated, in post-Animikie times.

Mr. Willmott's own observation, that the Michipicoten iron-bearing rocks occurred neither in the Keewatin schists, nor in the Laurentian granites, nor in the Lower Huronian conglomerates, which border that strip for a distance of 60 miles in length and in varying width, supplies the very explanation that he desires,

namely, that the eruptions of younger rocks occurred along a line of weakness where the older rocks were cut out. Similar examples might be quoted from many localities in our western districts, but also just as many in which we find the pyrite deposits in the enlarged planes of the Keewatin schists, produced by laccolithic intrusion of basic rocks.

As an explanation of the fact that these deposits contain not only sulphide, but also a carbonate of iron, it may be assumed that in the earliest history of our globe magmatic waters, fumaroles and other volcanic emanations contained iron, not only in the form of a sulphide but also as a carbonate, and that a considerable portion that might not have been carbonated at the lower depths, became so after ascending to the surface, because in those early periods the outer atmosphere must have been saturated, or at least impregnated with a large percentage of carbon dioxide. Proof is furnished by the Mattawin, Hunter's Island, Steep Rock Lake, Animikie and all other Lake Superior iron deposits, that a large, if not the largest, portion of the iron ores of that age were laid down as carbonates, and therefore there is nothing so very astounding in the fact that the Michipicoten pyrites occur associated with siderite.

Before concluding, I wish to say that Mr. Willmott is hardly justified in complaining of my remarks regarding the statements, made in his first paper, concerning the Schreiber pyrrhotite deposits. He wrote: "Near Schreiber . . . . is a pyrite, of a different character, ... mixed considerably with pyrrhotite and associated with a diabase." It will have been noticed that Mr. Willmott mentioned this deposit among other "iron disulphide" deposits, and further he calls it a pyrite in which a certain amount of pyrrhotite is mixed with it. The fact that he associates this deposit with a diabas will not be taken to signify that he did not intend to class this deposit as a pyrite produced by sedimentation; otherwise he would have given a clearer definition of its origin. He has, however, fallen into the same error as regards the Schreiber deposit as he fell into in the case of the Kaministiquia deposit. Both are of the same nature; both are true pyrrhotites, produced by magmatic differentiation, from rocks which are, in neither case, diabas, but altered diorites. Moreover, there are in either locality at least five or six such deposits.

Your truly,

F. HILLE, M.E.

Port Arthur, Ont., Sept. 10, 1908.

Canadian Mining Journal:

Dear Sir,—Your correspondent takes exception to a statement said to be from the Geological Records concerning the origin of a fire in the coal seams of Glace Bay more than a century ago, and states that no one in Cape Breton ever heard this version of the ocurrence. He further states that Brown's History makes no mention of it. Whether true or not, the most commonly accepted theory of the fire which occurred at Burnt Head is that it was fired by the French, as it was being worked by the English. It was defended by a blockhouse or fort garrisoned by fifty men, and was frequently attacked by roving bands of French and Indians. If your correspondent will turn to page 50 of Brown's History, which he quotes, he will read quotations from "History of Cape Breton" by M. Pichon, at that time Secretary to the Governor of Louisburg, in which he refers to a party of officers being sent by the Governor of Louisburg in the spring of 1752 to survey the coasts and gather statistical information. Pichon refers to this mine and fort, and states that the pit took fire in 1752, which is the date of their visit, and that both pit and fort were destroyed, but he does not mention the origin of the fire. Traces of this fort and the ravages of the fire in the cliffs are still plainly visible at a point still known as Burnt Head, where the Dominion Coal Company is working the Hub seam of coal.

Another story is that it was fired a second time and at a much later date than above recorded. This story is that during the lease of all the coal fields of Cape Breton to the General Mining Association some officers of the company, whose duty it was to patrol the coast to prevent poaching, discovered some pits at Burnt Head were being worked by coal poachers, and in order to stop this the officers exploded powder in the mouth of the pits or slopes in order to destroy the works and prevent any further operations, thus deliberately setting fire to the seam. It could hardly be looked upon as a reflection on the brave Frenchmen who were then constantly at war with the English, if they did destroy their property.

Yours truly,

C. M. ODELL.

ABITIBI LAKE DISTRICT.

Editor The Canadian Mining Journal:

Dear Sir,—Having just returned from Abitibi Lake, where I have been engaged in making a geological map of that area for the Bureau of Mines of Ontario, I am writing you a few impressions that may be of interest to some of your readers.

In 1900 the writer visited that area as geologist to an exploration party for the Bureau of Mines, and it is a great contrast to visit the same area now, only eight years later. At that time it was a week's journey by canoes and portages over the "Quinze" route, which forms the head waters of the Ottawa River. The starting point then was Temiskaming Station on the C. P. R. Now one can reach the same area in one day from the end of steel at McDougal's Chute on the Black River. Here a line of steamboats ply between the Chutes and points on Abitibi Lake, so that this area, which seemed so far away only eight years ago, is now at our very door.

Three districts in New Ontario have recently attracted attention as possible gold fields, viz., Larder Lake, Night Hawk Lake and Abitibi Lake. Gold was reported in Bureau of Mines reports in 1900, but the Abitibi Lake area did not attract much attention till 1907, when a pronounced rush took place, as evidenced by the promiscuous staking that was done there. If any honest, genuine mining man wishes to see the length to which men will go in a mining rush, where inspection is not operative, he has but to visit Abitibi Lake. Making all possible allowance for ignorance as to what is "valuable mineral in place," or even what is a possible economic occurrence, it is still painfully clear that a large part, yes, a majority of rush prospectors think nothing of the perjury of which they are guilty. One has only to see some of these disgraceful stakings to affirm that. Whether the present system of inspection as practised is best or not, certainly the underlying principle of inspection, viz., "discovery," must be insisted upon, to preserve for proper purposes those areas which are not nor ever can become mining lands.

This last point brings me to consider what I believe to be the future of the Abitibi District. Gold has been found at Abitibi Lake, it is true, but it can hardly be called a gold field. Three properties have been prospected honestly and well. The most important work has been done by Mosure Bros., on Shaft Island, numbered on the Government mays as 173. Here a shaft about 73 feet has been sunk on a quartz vein, varying in width from 4 inches to 4 feet. Free gold can be seen in selected specimens, and no doubt much of the ore in which no free gold can be seen assays well. The body, however, is not large, and unless the values run high it would be a difficult proposition.

The second property of importance is the Big Pete Mining Company's location on the east shore of the Lower Lake Abitibi. This company has a large vein of sugary quartz, impregnated with pyrrhotite, pyrite, chalcopyrite, graphite, etc. The manager was setting a diamond drill, which is to thoroughly test the veins at depth, and the results of these tests will be awaited with interest. A third party were working under a Mr. Reese, of Detroit, developing a quartz vein in diabose on the big island No. 149, just at the north end of the narrows which connect the two parts of Abitibi Lake. This work is still going on, but at the time of the writer's visit no free gold could be seen. It does not look, therefore, as though Abitibi Lake is to become famous as a mining camp.

As mentioned above, I believe the future of this area lies in agriculture. A generally mistaken impression seems to have been formed by the public in older Ontario, viz., that the portion of Ontario lying north of the C. P. R. main line is practically a rocky waste, with possibilities only as a mining district. This is decidedly incorrect, and a very few years will justify the confidence the Legislature of Ontario placed in that north land when it undertook the construction of the T. & N. O. Railway as a public utility.

Beginning at the town of New Liskeard, just north of Cobalt, is an area of roughly one million acres of splendid sandy clay loam, just sufficiently rolling for good drainage. It is well watered, and will be well served by the T. & N. O. Railway and the G. T. P. Railway when completed. I brought out timothy and ripe oats and barley pulled the second week in August. The samples are excellent, and the hay especially good. These were grown in the small clearings around the railway "caches" and horse-stables. Moreover, the engineers of the G. T. P. Railway have gardens, in which they have successfully grown peas, beans, carrots, onions, beets, radishes, lettuce, celery, cabbage, potatoes, in fact every table vegetable was grown by one or another. Mr. E. P. Goodwin, the divisional engineer, even ripened tomatoes on his vines.

This information goes to show clearly that once the country is cleared and cultivated, it will offer a splendid agricultural district. The land is timbered entirely with pulpwood, and will therefore be easily cleared, as a ready sale for the pulpwood can be had at the railway once it is operate.

M. B. BAKER, B.A., B.Sc.
School of Mining, Kingston.

Editor The Canadian Mining Journal:

Dear Sir,—In your edition of September 1, 1908, you give, on page 437, a list of the operating mining companies of Nova Scotia.

Your correspondent has made one important omission in failing to mention the Oldham Sterling Gold Company, Limited, operating at Oldham, in Halifax County. This mine has been in continuous operation for six years, and is mining successfully at a depth of 1,250 feet. The mine is easily the second largest producer in the province, its production being exceeded only by that of the Boston Richardson, at Isaac's Harbor.

Trusting that you will be kind enough to make the correction, I am,

Very truly yours,
C. V. BRENNAN.

Oldham, Nova Scotia, Sept. 18, 1908.

SPECIAL CORRESPONDENCE

Glace Bay, Sept. 17.—There has been a little slackening off in the coal trade in Cape Breton during September as compared with the rest of this summer and with the same period last year. Last year it will be remembered the opening of navigation was unusually late, and the whole shipping season was marked by a scarcity of labor and a falling off in the effectiveness of the working force generally. This phenomenon was not confined to Cape Breton, but was pretty generally remarked in all English speaking countries. The result was that large outputs were requisite in September and October in order to fill the St. Lawrence requirements before the ice formed again. This year conditions have been very different. Navigation opened at least six weeks earlier than in 1907, and good outputs, exceptional outputs indeed, have been obtained all through the summer. Most of the Cape Breton companies are ahead on their shipping programme. The Dominion Coal Co., for instance, is 300,000 tons ahead of last year at this time. This is partly due to the favorable season, but more to the fact that labor has been more plentiful than of late years, and to the men having worked more steadily. We are feeling the reflex of the financial depression that has affected this continent since last winter, and the probabilities are that the coal trade will be quiet until next spring.

The miners of Cape Breton, more particularly those employed by the Dominion Coal Co., are to a certain extent to be blamed for the slackness that is manifesting itself. The actual capacity of the Dominion Coal Company's mines is very little greater this year than it was last, but during the whole of last summer, as we have said, owing to the disinclination of men to work, the outputs were restricted, and the Coal Company found it difficult to fulfil their contract requirements. This season they decided not to incur such a risk again, and they estimated their outputs very conservatively, making contracts accordingly. It will also be remembered that a little later than this time last year the Dominion Coal Co. offered their workmen the option of a three years' contract on the fairest terms, giving as their reason for so doing the importance of having settled conditions and long term contracts for the successful prosecution of their business. The Coal Company pointed out that these terms were offered in the face of a falling market, and a probable industrial slump. The men afterwards accepted under a Conciliation Board less favorable terms than were originally offered them, but the good faith and sincerity of the Company's offer is now evidenced by the fulfilment of the forecast of the management.

The supply and price of pit timber is a question that is every

year becoming more serious to the operators of coal mines in this Province. Mining at greater depths, the increased amount of long-wall extraction in the thinner seams, and the generally greater amount of roof that must be supported as mines go to the deep, and as the old pillars are withdrawn, are all matters that tend to increase the demand for pit timber. In common with the rest of Eastern Canada, the timber resources of Cape Breton and Nova Scotia have been shamefully squandered and wasted. The combined effects of insect pests, forest fires and reckless and unscientific lumbering operations have made good and suitable pit timber a difficult thing to obtain in a country where it should be a staple product. In Pennsylvania and other States of the Union coal operators have found it has paid them to systematically raise their own pit timber. About seven years growth under suitable conditions will produce timber that is very suitable for pit props. In the Black Forest of Germany, in the Vosges Mountains of Frances, in Sweden and Denmark, forestry has been raised to a fine art. Land suitably planted is found to return as much from timber as can be obtained from cultivated farm lands. It is an interesting sight to walk through the groves of one of the Imperial plantations in the Black Forest, and to see the straight clean timber, in symmetrical lines, every stick of which will be felled at an appointed date, to be succeeded by fresh saplings. It is only such scientific methods as these which have enabled the Baltic Provinces to supply the insatiable demands of the British coal mines year after year, and one has only to view the floating acres of pit timber in the East Coast ports of England to realize how profitable such a trade must be. We were recently told by a gentleman who buys large quantities of mine timber that there were large areas of young larch in the province, which would make excellent pit timber, if properly thinned out and cared for, but which in all probability will grow up useless and stunted for lack of care, or will some day be licked up in a forest fire. Scientific afforestration is a crying need of this continent, and it is needed in Cape Breton. That this country can produce large timber, or at least commercial timber, is evidenced by the large stumps that one notices in the woods, and the lusty growth of the young timber. Much of Cape Breton is sterile and stony country, and utterly unsuitable for farming, but under proper laws and supervision it could doubtless be made to raise profitable growths of timber.

The Draeger apparatus of the Dominion Coal Company received its baptism of fire on the 10th inst. at Sydney Mines, and the "boys" from the Rescue Station returned covered with grime and glory. They returned from Sydney Mines in the evening of the 11th after having had probably the most strenuous double shift in their lives. As they lined up in front of Sydney postoffice waiting for the Glace Bay car, they were about as tired looking a crowd of men as one would wish to see, and no doubt they slept well when they reached home. One could hardly imagine a more exacting task than these men had performed, and after their work at Sydney No. 1 they may be classed as past masters in the mysteries of oxygen apparatus. They did their work in a very effective manner, and made no fuss about it, as is the wont of miners when asked to render assistance. All the same the showing of the Glace Bay men was most gratifying, proving as it did their own effectiveness should a like emergency arise here, and the effectiveness of the Rescue Station equipment. This latter will shortly be augmented by a "Dr. Brat" automatic oxygen reviving apparatus, a most ingenious arranement, which will induce artificial breathing, and will revive a person who is "gassed" more quickly than anything else. This arrangement can also be used to resuscitate unconscious persons on whom it is not possible to use the ordinary Slyvester method of inducing artificial respiration, by reason perhaps of a broken arm or fractured ribs or similar disablement. The coal company are also purchasing a stretcher, fitted with a similar arrangement to that described, on which it will be possible to strap securely an injured or unconscious person and supply him with oxygen. The stretcher is fitted with a grooved wheel which can be run along the rail, and it is thus possible for a rescurer wearing a breathing apparatus to drag an injured person through after-damp or other noxious gases, and keep him alive until he can reach the outer air.

QUEBEC.

New Asbestos Industry for Quebec.—The D'Israeli Asbestos Company, which was organized recently to develop their property at D'Israeli, Quebec, are actively pushing to completion their railroad which runs from D'Israeli to the quarries, a distance of some three miles. The asbestos ore found on the propert yof the company is of exceptionally high grade quality, and from an examination of the engineer's report the product from this mine can be mined and milled cheaply and conveniently.

It is expected that the plant, which will be of a 250-tons capacity, will be constructed and in operation about December 1, next.

ONTARIO.

Cobalt.

La Rose.—The preliminary statement of production and earnings for the months of June, July and August, shows a net profit of:—

June	$82,867.55
July	127,329.00
August	108,603.00
	$318,799.55

The statement for the August production was as follows:—

	Tons.	Silver Contents. Ounces.	Net Value.
Shipments	645	278,570	$124,656
On hand August 31	40	78,000	40,000
Production	645	356,570	163,406
Less on hand July 31	57.94	79,739	38,803
	627.06	276,831	$124,603
Estimated expenses			16,000
Net profit for August			$108,603

As practically no ore has been stoped from the mine, there is no reason why this production should not be maintained, or materially increased.

White-Hargreaves.—The suit brought by the Attorney-General of Ontario to set aside the leases granted to the White Silver Mining Co. and E. C. Hargreaves on three claims located in the proven producing area of the Cobalt District, has been settled. This settlement provides that E. R. C. Clarkson is to hold the three claims as trustee for E. C. Hargreaves, Wm. F. White, Jas. McKay and Jas. C. McMillan. The Ontario Government is to receive a royalty of 25 per cent. on the gross output of the mine. These properties are exceedingly well located and the development work, which has been suspended since the spring of 1906 owing to litigation, should result in proving some valuable veins.

Watts (King Edward). The new concentrating mill at the King Edward will be in operation next week. It has been decided to gradually increase the capacity to 200 tons per day. There are over 15,000 tons of milling rock on the dump. The underground developments are very favorable. A very rich vein ten inches wide was recently discovered and a large tonnage of milling ore is blocked out.

Coleman Cobalt (Amalgamated).—A very promising vein of calcite and silver has been found in the Coleman Cobalt lot, one

of the properties of the Amalgamated Cobalt Mines Co. This property is under lease to a syndicate headed by S. D. Madden.

Coniagas.—A new battery of ten stamps is in successful operation at the Coniagas mill. Twenty more stamps are being installed, which, when completed, will give the mill a capacity of 100 tons a day. As the output of the mine has been limited to the capacity of the mill, a large increase in output will result.

Temiskaming.—The new plant, which will be one of the most complete in Cobalt, is well under way. The plant will consist of a 20-drill Sullivan compressor, high-pressure boilers and a new hoist. A three-compartment shaft is being sunk to a depth of 250 feet to connect with the present workings. A 60-ft. steel head frame and a shaft house will be built. In an upraise from the 200-foot level the ore body has widened out from 6 inches to 2 feet of very rich ore.

Crown Reserve.—The exceedingly favorable development of the Crown Reserve vein, which is the widest and richest in the camp, is still the chief topic of interest in Cobalt. It is impossible to arrive at a fair estimate of the values existing between the open cut from which the first shipments were made, and the prospect cross cut from the working shaft. It is, however, safe to say that no vein in the Cobalt Camp can show an ore body extending for an equal distance of anything like such values. An open cut has been made 45 feet deep and 50 feet long at the west boundary of the property adjoining the Silver Leaf, and a winze sunk a depth of 40 feet from the bottom of the cut. The vein is persistent for the entire depth, averages over 5,000 ounces silver, and is from 12 to 30 inches wide. The wall rock is also heavily impregnated with native silver. A working shaft has been sunk at a distance of 200 feet from the west boundary line to a depth of 118 feet and a cross cut driven in 80 feet from the shaft at the 100 foot level. At a distance of 25 feet from the shaft the main vein was encountered and a drift started west towards the winze. This drift is now in 35 feet, all in high-grade ore, the vein averaging 10 to 12 inches in width. This indicates that the vein is continuous from the Silver Leaf line to the working shaft, practically blocking out a body of very high-grade ore 200 feet in length. The Silver Leaf shaft, which is also near the boundary line of the two properties, is producing high-grade ore at a depth of 200 feet. The new plant is practically completed. A six-drill compressor, boilers, electric light plant, etc., have been installed and a 60-foot head frame completed. An extensive plan of development has been inaugurated. At the 100-foot level the cross cut will be driven in to the north boundary line, a distance of 100 feet. From this point a prospect tunnel will be run to the east the full length of the property, approximately 800 feet, and at intervals of 500 feet, prospect cross cuts will be run. It is expected that the No. 7 vein of the Kerr Lake Mine will be encountered in the prospect tunnel about 200 feet from the cross cut. Ore valued at $300,000 has been shipped. There is approximately $200,000 worth of high-grade and $25,000 worth of unsorted ore in the ore house. It is estimated that over $150,000 worth of ore is left standing in the mine.

Rochester.—A party of directors of the Rochester Cobalt Mining Company visited this property last week. It was decided to increase the working force and sink the main shaft to a depth of 200 feet. The improved outlook at the Badger Mine, where high-grade ore is being taken from the main shaft, offers every encouragement that the Rochester vein will show paying values at depth. The veins on both properties are in a contact between Keewatin and diabase.

Davis Silver Cobalt.—Two 20-acre claims of this company, which adjoin the Badger Shamrock, and Fisher-Eplett, on the north, have been leased to the Shamrock Company. A discovery of two parallel veins of calcite and cobalt with small silver values has been made on one of the Davis properties at Giroux Lake. Twenty men are now employed trenching and a shaft is to be sunk to a depth of 100 feet.

Montreal River District.—The important discoveries which have recently been made in the vicinity of Bloom, Miller, Everett, Le Roy and Gow Ganda lakes, have resulted in a great influx of prospectors and the blanketing of large areas of more or less promising territory. The situation regarding the proper location on the map and the issuing of applications and certificates of record is fast becoming so complicated that there is grave danger of endless litigation. This territory is unsurveyed and the staff of inspectors and assistants is totally inadequate to handle the situation. Twenty-seven claims were recorded in one day at the office of the recorder at Elk Lake. As no surveys have been made the recording office is forced to take the description of the licensee, with the result that a large number of the claims recorded are more or less improperly and incorrectly described and placed on the recorder's map. There is a strong feeling in this section that the force of inspectors should be greatly increased and the new territory, which is undoubtedly exceedingly promising, should be surveyed at the earliest possible moment.

Temiskaming and Hudson Bay.—In running a prospecting tunnel at the 100 foot level, a vein of calcite and native silver, five inches in width, was found. It will run 6,000 ounces or more. This vein is 20 feet from the northern boundary of the Trethewey and will run right into that property. The Trethewey will catch the Meyer vein also. This is being driven on now by the Nipissing Co. at the 80-foot level. Another 20 feet will bring the drift up to the Trethewey line. The values are high in this vein.

O'Brien.—At the 175-foot level in the No. 2 shaft, a cross cut being run southwest cut a five-inch vein of ore that will run 2,800 ounces. This is not more than 40 feet from the Chambers-Ferland line and running into it.

BRITISH COLUMBIA.

Rossland.

The ore body on the 1,650-foot level of the Le Roi Mine is showing up well under development. The shoot at this point varies from 15 to 20 feet in width and carries good values. The ore body on the 1,450 feet level looks promising but more development will be necessary to prove this ledge. The Le Roi profits for August were of a satisfactory character.

The members of the Canadian Mining Institute and their distinguished guests looked over the city and the adjacent mines and were entertained by a banquet here. The local mining men and citizens did all in their power to extend that hospitality to the visitors which is a thing apart from the hospitality shown by other districts.

A gallows frame is being built on the Idaho section of the Centre Star property and the shaft now doubt 35 feet on the ledge, will be sunk to a greater depth.

The lessees of the Blue Bird have shipped another car of hand-picked ore to Trail smelter, from which good returns are anticipated.

Active work continues on the various small properties and shipments will be made from several in the near future.

Boundary.

The party of foreign mining men and the members of the Canadian Mining Institute were greeted with a 21-gun salute from Granby Hill when they arrived in Phoenix on the 18th. The party was shown through the premier copper mines by A. B. W. Hodges, local manager, G. W. Wooster, treasurer, and other Granby officials. They entered the mine by the main outlet, the Victoria shaft, with its complete hoisting, crushing and shipping facilities. The compressor plant was viewed and later the party was taken into the depths of the hill on the underground electric railway, through No. 3 tunnel. The tourists were treated to an innovation by the management in one of the large stopes. This prodigious cave, 125 feet high and about the same distance wide, was viewed by the party from the brink of the

tunnel level. Away in a distant region of the stope Mephistopheles was seen rejoicing in a wealth of brilliant fire, the scene ending in a burst of fireworks. After a luncheon at the Granby Hotel the party left Phoenix for the Grand Forks smelter.

The coke situation in the Boundary is getting into much better shape and the Granby is once more running seven furnaces. As a consequence of this activity at the smelter the Granby shipments have increased in the last two weeks from 13,741 tons to 25,147 tons for the week ending Sept. 19th. The B. C. Copper Co. was not affected to any extent by the coke shortage, as their supply of coke is obtained from the International Coal & Coke Co., Coleman, Alta., and they have been able to maintain steady shipments; and, in fact, to increase their tonnage from the Oro Denoro property.

Work has been resumed on the Brooklyn and Rawhide mines of the Dominion Copper Co., but up to this date the smelter has not been blown in. The opinion has been expressed that with the management that is necessary in the Boundary for successful mining and smelting and with up-to-date mining and transportation facilities the Dominion Copper Co. could be made to pay as well as other Boundary concerns. The ore in the Phoenix mines of this company is in some portions even richer than the Granby ore and it looks as though in the end the Dominion Copper Co. could be made to pay good profits.

The Greenwood Tunnel scheme is still heard from occasionally. The promoters state that work will be commenced shortly; they also report that an application has been made for tramway rights, to be used in connection with the bore. At present the predominant idea seems to be the cutting of rich ledges that may or may not lie in the path of the proposed adit. The tunnel as a commercial enterprise is $3,000,000 distant at this stage and a little nebulous.

A company is being formed to take over and develop the Greyhound group, near the B. C. Copper Co. mines in Deadwood camp. This is a promising group and those who know the property will be glad to see work once more going ahead there.

The B. C. Copper Co. is negotiating for the purchase of the Molly Pritchard and Athelstan Fraction, in Wellington district. They have secured an option on these claims from the owners and engineers of the company have been over the ground and examined the property. The ore on these claims is an arsenical iron ore carrying paying values in gold and silver.

The B. C. Copper Co. is securing property in the different camps, making sure of a steady ore supply for the future. The company already controls several meritorious mines just across the line in the State of Washington and has more recently bonded the Acme, near Kettle Falls, Wash., for $50,000.

The Dykehead claim, near the Fife lime quarry of the Consolidated Co., has been bonded for $50,000 and will be developed all winter. A 100-foot development tunnel is to be driven on the Bruce, Midway.

The returns from the last car of 21 tons of ore that was shipped from the Sally have been received. After freight and treatment charges, which were heavy owing to the long haul, were deducted (they amounted to $80 per ton) the carload shipment returned the company $3,175.

The Snowshoe continues to ship over 400 tons of fluxing ore per day to the Trail smelter.

Nelson.

There is much activity exhibited at Salmo. A telephone system is to be put into the mines on the surrounding hills. A deal is on with Minneapolis capital for the Relief Mine. The Arlington Mine, controlled by English capital, is producing ore steadily. The average value of the ore extracted is $75 per ton. The ore body is a blanket lead and runs from two inches to a foot in width.

A rich strike is reported from the Nugget. A ledge has been exposed carrying rich values in gold.

The Silver King at Nelson is shipping to the Trail smelter. At the Fisher Maiden, high-grade ore is being sacked and a shipment will be made soon.

The North Star still continues to produce over 150 tons per week despite the gloomy reports that have been sent out from time to time that there was no more ore in the mine.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax.—Serious trouble is brewing in the ranks of the Provincial Workmen's Association. Delegates to the Ground Council have decided by a vote of 48 to 27 not to amalgamate with the United Mine Workers of America.

Sydney, Sept. 25.—The Domnion Iron and Steel Company has received an order for 9,000 tons of 80-pound steel rails for the Southern Pine Joint Railway, to be delivered by steamer direct to Couriche, via Suez Canal, India. The company will commence to roll this order October 13th. The order was secured in competition with the world, and had to be approved by the Viceroy of India.

ONTARIO.

Cobalt.—(Special to The Canadian Mining Journal).—The recent discovery near the north boundary of the Trethewey Mine is one of great importance. The discovery was made under unusual circumstances. The Temiskaming & Hudson Bay Company has ceased driving on what appeared to be a worthless stringer approaching so closely to the Trethewey line that further operations seemed inadvisable. The Trethewey Company, after having conducted extensive surface operations at the north end of their property, entered into an agreement with their neighbors to have the underground work continued on the Trethewey ground at the 100 foot level with the object of gaining information at depth with a minimum of cost to the Trethewey Company, and with advantage to the Temiskaming & Hudson Bay Company, which would gain information that otherwise it might not seek. The result is that in following the small stringer towards the Trethewey line a large and rich vein intersecting the line between the properties and trending about northeast and southwest, has been encountered. Should the present strike of the new vein continue, it will traverse practically the centre of the Trethewey property, and add enormously to its value. This company has recently installed a crushing and jigging plant, which is working very satisfactorily. The result will be that instead of shipping 4 or 5 carloads per month of various grades, the shipments will be reduced to one or two carloads of high-grade ore, thus saving freight and treatment charges on about three fifths of the mine product. This saving will amount to about $2,000 per month, besides which the price to be realized for the ore shipped will be considerably enhanced, as high grade ores meet with better terms from the Smelters than ores of lower grade.

Cobalt, Sept. 19. It is rumored that Nipissing and La Rose are to combine in the erection of a concentrator to treat the output of both mines. Such a move would result in a saving of $10 to $13 in freight on the heavy low grade ore shipments from La Rose.

Sault Ste. Marie.—Specimens, rich in gold, have been brought into town from the Golden Reed Mine at Michipicoten.

ALBERTA.

Lethbridge.—The Royal Collieries Company, Ltd., of which H. N. Galer, of Spokane, is president, expects to attain an output of 300 tons per day by the 15th of November. The seam on which the company is working is 4 feet 3 inches thick, and is reported absolutely clean. Marketing will present no difficulty.

BRITISH COLUMBIA.

Fernie.—On the evening of September 14th the Canadian Mining Institute excursionists returned to Fernie after inspecting the Coal Creek collieries. The evening was spent at the offices of the Crows' Nest Pass Coal Company. The smoker given by the company was signally successful. President G. G. S. Lindsay, occupied the chair. The entertainment was essentially Scotch. Reels, sword dances, bagpipes, etc., were the principal ingredients of the programme. The special train left at midnight for the west. The excursionists were met at Coleman by Manager J. D. Hurd and Superintendent Charles Sinister, of the C. N. P. Coal Company, who accompanied them as far as Fernie.

Rossland, Sept. 16.—Delayed by the burning of a railway bridge, the Canadian Mining Institute was a day late in reaching Rossland. The special train is expected to-day, however. The visitors will be given a banquet at the Hotel Allen, and will leave at midnight for Trail. During the day they will inspect the mines near the city.

Phoenix.—A group of Boundary proprietors, including the Molly Pritchard and Athelstan fraction, the Jackpot, the Buttercup, all about three miles from Phoenix, are said to have been acquired by the British Columbia Copper Company.

Rossland.—Le Roi Mine is looking well at 1,650-foot level. The ore shoot is from 15 to 20 feet wide. On the 1,450-foot level the ore shoot is showing promise. The company's profits for August were above the average, and September will probably exceed August.

Nelson, Sept. 20.—Shipments of ore for the week ending September 19th were 3,000 tons greater than at any period of 1908, and were within a few hundred tons of breaking all records. Five thousand tons of zinc ore have been shipped lately to American smelters.

YUKON.

Dawson City.—An innovation in the way of electric elevators is to be introduced by Boyd & Jepperson, who operate on 82 below, Sulphur Creek. By sinking an incline shaft, in which the bucket line will be operated, the necessity of handling the overburden is done away with. The hydraulicing of the pay will be done with a pulsometer and hot water. It will be possible to maintain a clean roof of even depth, and thus the handling of waste will be reduced to a minimum.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Conciliation Board of the Federated Districts of England and North Wales have reduced miners' wages 5 per cent.

The Headquarters of the Institution of Mining Engineers has been transferred from Newcastle-on-Tyne to London.

A new colliery syndicate is being organized to acquire the minerals of Pentremawr and the southern portion of Bettwa Mountain, in Wales. From a quarter to half a million pounds will be invested, and the pit put down will, it is said, be the deepest in Wales.

RUSSIA.

The Russian platinum industry is suffering by reason of the fall in prices and a decrease in the demand owing to the substitution of other metals. The Government is being asked to come to the assistance of the producers.

The Russian copper industry is practically under the control of a trust known as the Mied Association, organized last January. Out of 1,100,000 poods probable production of copper, 90 per cent. is in the hands of the association.

NORWAY.

An attempt is being made to provide for compulsory arbitration, a measure introducing it being drafted for submission at the next session of the Storthing.

GERMANY.

Messrs. Benzenberg & Hengstenberg are erecting a large briquette works at Ruhr Harbor. Petroleum pitch will be used as a binding medium for the working up of lean coal slack.

The Wurttemburg Government has issued a warning to investors against wild-cat coal-mining enterprises.

AUSTRALASIA.

A recent discovery of tin made by Chinese at the Gulf, Emmavitle, New South Wales, is declared to be the richest ever made in the locality. The lode is 15 feet long by 5 feet wide, so far as uncovered, and yields a ton of tin per day.

The Elmore concentrating process, which was tried some time since for the refractory copper ores of Fort Burke, Cobar, New South Wales, but discontinued as unsuccessful, is being given another trial there, under the supervision of one of the patentees.

The Victoria State Government is asking for an appropriation £100,000 for the encouragement of mining. Of this, £75,000 will be devoted to the direct encouragement of gold and coal mining.

A Government party sent to Derby, Western Australia, to investigate the iron deposits on an island near the coast report immense deposits in the cliffs rising 500 feet from the sea on an island in Yarnpi Sound. Preliminary assays show the ore to contain 79 per cent. iron.

SOUTH AFRICA.

The prospects of the tin mining industry of the Transvaal have improved greatly during the last few months. In the Bushveld about £43,000 worth of ore has been produced in the last six months, and many additions made to producing mines.

The wages of white miners in Rhodesia have been reduced about 20 per cent.

The Transvaal gold output for July was 584,455 oz., valued at £2,482,608, an increase of 9,482 oz. over the previous mouth. This constitutes a new record, being the largest amount of gold produced in any one month in the Transvaal.

UNITED STATES.

A new mining camp has been established 14 miles southeast of Cima, San Bernardino County, Cal., named Gold Valley, where a tent city has sprung up in a few weeks. A number of veins have been discovered, and though they are small, the ore is of high grade.

Colorado mining men have been holding a two days' session in the Denver Chamber of Commerce. Prominent among the

subjects discussed were the need of legislation for the punishment of fraudulent and untrue statements in mining properties, and the means requisite to bringing the mining advantages of the State before the world.

A commission, comprising the head of the Explosives Commission of Britain, the heads of the German and Belgian Mining Commissions, and Dr. J. A. Holmes, of the U. S. Geological Survey, have been in consultation with Indiana mining officials at Terre Haute, as to the prevention of mining disasters, as a result of the Hemenway bill appropriating $150,000 to cover the cost of investigating mining conditions.

All the mines of the Boston & Montana Company at Butte, Montana, have resumed operations after a shut-down of three months.

PHILIPPINE ISLANDS.

The Government coal mine on Batan is being opened, and it is expected that shipments of 2,500 tons per month can be made beginning with October. The Insular Coal Company is pushing work on its mine at Camansi, and will build a railroad to the port of Danao.

STATISTICS AND RETURNS.

INVERNESS RAILWAY & COAL CO.

Shipments, August, 1908	19,577
Shipments, August, 1907	23,153
Decrease, August, 1908	3,576
Shipments, eight months, 1908	172,243
Shipments, eight months, 1907	154,150
Increase, eight months, 1908	18,093

ACADIA COAL CO.

Shipments, August, 1908	26,393
Shipments, August, 1907	29,071
Decrease, August, 1908	2,678
Shipments, eight months, 1908	213,948
Shipments, eight months, 1907	202,045
Increase, eight months, 1908	11,903

INTERCOLONIAL COAL CO.

Shipments, August, 1908	17,595
Shipments, August, 1907	25,755
Decrease, August, 1908	8,160
Shipments, eight months, 1908	171,368
Shipments, eight months, 1907	181,571
Decrease, eight months, 1908	10,203

CUMBERLAND RAILWAY & COAL CO.

Shipments, August, 1908	24,213
Shipments, August, 1907	nil
Increase, August, 1908	
Shipments, eight months, 1908	278,082
Shipments, eight months, 1907	213,409
Increase, eight months, 1908	33,673

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt Camp, and those from January 1 to date:—

	Week end. Sept. 12. Ore in lbs.	Since Jan. 1. Ore in lbs.
*Cobalt Central	49,290	342,975
City of Cobalt	254,380	1,035,620
Drummond	660,011	1,637,790
La Rose	267,280	5,781,592
Nipissing	304,100	3,754,727
Nova Scotia	40,500	392,275
O'Brien	257,680	4,884,307
Right of Way	113,000	849,270
Temiskaming	102,940	748,620

*Concentrates.

The total shipments for the week were 2,008,760 pounds, or 1004 tons.

Following are the weekly shipments from Cobalt Camp and those from January 1 to date:—

	Week end. Sept. 19. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	850,950
*Coniagas	63,000	965,960
Cobalt Lake	.....	341,683
Crown Reserve	60,000	242,000
**Cobalt Central	.....	342,975
Chambers-Ferland	61,000	121,650
City of Cobalt	.....	1,035,620
Drummond	.....	1,637,790
Foster	58,900	297,300
Kerr Lake	.....	730,174
King Edward	.....	127,240
La Rose	189,250	5,970,842
McKinley	.....	1,240,040
Nipissing	377,289	4,132,016
Nova Scotia	40,500	392,275
Little Nipissing	.....	40,150
Nancy Helen	.....	367,427
O'Brien	137,900	5,022,267
Peterson Lake	.....	41,237
Right of Way	122,850	927,120
Provincial	.....	146,120
Silver Leaf	.....	258,000
Silver Cliff	.....	72,000
Silver Queen	.....	1,123,990
Townsite	.....	311,700
Temiskaming	.....	748,620
Temiskaming & H. B.	60,000	1,160,500
Trethewey	.....	1,910,476
Watts	80,590	561,680

The total shipments for the week were 1,199,770 pounds, or 600 tons. Total shipments from January 1 to date are 31,963,813 pounds, or 15,982 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000. In 1904 the camp produced 158 tons, valued at $130,217; in 1905, 2,144 tons, valued at $1,473,196; in 1906, 5,129 tons, valued at $3,900,000.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ended September 18th was 19,284 tons, or a daily average of 3,205 tons. For the corresponding week of last year the output was 21,905 tons, a daily average of 3,651 tons.

The output of the Crow's Nest Pass Coal Company collieries for the week ending September 25th was 16,643 tons, a daily average of 2,774 tons. The Michel mines were idle Monday, pay day. For the week ending September 27, 1907, the output was 19,439 tons, a daily average of 3,240 tons. For the same week in 1906 the output was 4,856 tons, daily average 809 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, Sept. 12.—The ore shipments from the various mines and the receipts at the smetlers of the districts of Southeastern British Columbia for the past week and year to date were as follows:—

	Week.	Year.
Boundary	33,333	926,616
Rossland	4,013	191,947
East of Columbia River	2,027	68,754
Total	39,373	1,187,317

SMELTER RECEIPTS.

	Week.	Year.
Grand Forks	19,102	718,688
Greenwood	12,624	186,626
Boundary Falls	.....	21,872
Trail	6,269	203,331
Northport (Le Roi)	1,140	57,978
Marysville	.....	5,730
Total	39,135	1,194,225

Nelson, Sept. 19.—Following are the shipments from the various mines and receipts at smelters of Southeastern British Columbia for the past week and the year to date:—

Boundary Section.

	Week.	Year.
Granby	25,147	743,835
Mother Lode	10,793	150,051
Oro Denoro	2,740	46,568
Snowshoe	1,556	4,150
Other mines	....	22,248
Total	40,236	966,852

Rossland Shipments.

Centre Star	2,510	119,924
Le Roi	2,915	56,054
Le Roi No. 2	718	21,114
Evening Star	31	114
Other mines	.....	222
Total	6,174	198,121

East of Columbia River.

St. Eugene	1,047	17,593
Whitewater (milled)	280	11,500
Poor Man (milled)	250	8,600
Queen (milled)	185	6,835
Bluebell	147	1,141
Silver King	292	499
Whitewater	21	1,263
North Star	67	2,789
Richmond	83	1,618
Arlington Erie	25	1,078
Rambler-Cariboo	21	889
Ruth	22	581
Reco	22	274
Monarch	22	274
Montezuma	22	86
Wellington	17	17
Spokane	13	13
Other mines	.....	17,133
Total	21,536	71,290
Grand total	48,946	1,236,263

Smelter Receipts.

Grand Forks	25,147	743,835
Greenwood	13,333	199,152
Boundary Falls	.....	21,872
Trail	7,413	210,744
Northport (Le Roi)	2,948	60,926
Marysville	.....	5,730
Total	49,041	1,242,266

The following are the figures of German consumption of foreign copper for the months of January-July, 1908:—

	Tons.
Imports of copper	94,501
Exports of copper	4,754
Consumption of copper	89,747

as against consumption during the same period in 1907 of 68,763 tons. Of this quantity 87,373 tons were imported from the United States.—Reported by L. Vogelstein & Co.

COMPANY NOTES.

FINANCIAL STATEMENT OF THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA, LIMITED, FOR YEAR ENDING JUNE, 30TH, 1908.

LIABILITIES.

Capital—Authorized $5,500,000.00		
Issued 53,552 shares of $100 each		$5,355,200 00
Sundry Banks—		
Bank of Montreal, Rossland—		
Loan and Overdraft. $1,551,319 01		
Accrued Interest.... 1,516 91		
"Snowshoe Account 29,707 92		
Canadian Metal Co's Account 125,000 00		
	$1,707,543 84	
Contingent Liability at June 30th, 1908, on drafts against Matte Shipments ..... $78,854.37.		
Bank of British North America—		
Pay roll account	2,465 65	
		1,710,009 49
Sundry Accounts Payable and Unpaid Dividends	56,147 15	
Payments on account of lead purchased	31,457 99	
		87,605 14
Reserve for Claims awaiting adjustment		20,000 00
Profit and Loss Account—		
Balance June 30th, 1907.....	55,586 00	
As per Statement, year ending June 30th, 1908.....	43,415 93	
	99,001 93	
Less:		
Dividend No. 7, paid Nov. 5th, 1907	66,940 00	
		32,061 93
		$7,204,876 56

ASSETS.

Mines, Mineral Claims, Shares in other Companies, etc.	$3,916,787 60	
Expenditure on Richmond Eureka Group	24,444 33	
Lease on "Snowshoe" Mine	29,707 92	
Expenditure on Phoenix Amalgamated Group	25,052 54	
		$3,995,992 39
Mining, Smelting, Concentrating and Refining Plants:		
Balance at June 30th, 1907	$1,282,116 35	
Add Construction Account, June 30th, 1907, to June 30th, 1908	315,750 40	
	$1,597,875 75	
Less:		
Sales of Machinery $ 197 18		
Depreciation 132,843 20		
	$133,040 38	
		1,464,835 37
Smelter Product on hand and in trasit to Refineries: Pig Lead, Bullion, Matte, Bluestone and Antimony	$311,738 24	
Ores and Metals on hand and in transit to Smelter at June 30th, 1908; values of metal contents corrected to Market quotations—less estimate for refining cost:		
Ores on hand $475,209 26		
Refinery metals on hand 336,264 72		
Ore in transit to Smelter 17,189 09		
	828,663 07	
		1,140,401 31
Mine and Smelter Stores and Material		334 000 59
Sundry Accounts Receivable	$116,107 86	
Loan to Canadian Metal Company: Secured by first mortgage on Assets	125,000 00	
		241,107 86
Insurance and Taxes paid in advance		24,441 77
Cash: Head Office, Toronto	$3,149 96	
Bank of British North America, Kaslo	484 90	
Eastern Townships Bank, Phoenix	446 41	
Imperial Bank, Cranbrook	16 00	
		4,097 27
		$7,204,876 56

Managing Director's Report.

Trail, B.C., August 15th, 1908.

To the Directors of The Consolidated Mining and Smelting Company of Canada, Limited:

Gentlemen,—I beg to submit the results of the Consolidated Company's operations for the year ending June 30th, 1908, including Balance Sheet, Profit and Loss Account, Production, and General Report.

(*To be continued.*)

DIVIDEND NO. 12, KERR LAKE MINING COMPANY, OF COBALT, ONT.

New York, Sept. 8th, 1908.

The Board of Directors have this date declared a regular quarterly dividend of Three Per cent. (3 p.c.) upon the capital stock of the company, payable September 19th, 1908, to all stockholders on record at close of business September 15th, 1908. Transfer books will be closed from September 15th to 19th, 1908, inclusive.

J. A. Jacobs. Sec.-Treas.

LA ROSE CONSOLIDATED MINES COMPANY.

Notice is given that a dividend of 3 per cent. for the quarter ending August 31, 1908, has been declared upon the outstanding capital stock of the company, and will be paid on the 20th day of October, 1908, to shareholders of record on October 2, 1908.

By order of the Directors, the transfer books will be closed between the 2nd and 20th days of October, 1908, both days inclusive.

Dated the 22nd day of September, 1908.

La Rose Consolidated Mines Company, per D. A. Dunlap, Secretary-Treasurer.

MARKET REPORTS.

Coke.

Sept. 25—Connellsville coke, f.o.b. ovens—

Furnace coke, prompt, $1.50 to $1.60.
Foundry coke, prompt, $1.90 to $2.00.

Metals.

Sept. 25.—Tin, Straits, 29.50 cents.
Copper, prime Lake, 13.50 to 13.625 cents.
Lake arsenical brands, 13.50 to 13.625 cents.
Electrolytic copper, 13.40 to 13.50 cents.
Sheet copper, 18 cents.
Copper wire, 15.25 cents.
Lead, 3.40 cents.
Spelter, 4.75 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 per oz.
Bismuth, $1.75 per lb.
Quicksilver, $43 per 75 lb. flask.

Silver Prices.

September 10	51 5-8	23 13-16
September 11	51 5-8	23 13-16
September 12	[illegible]	23 13-16
September 14	51 5-8	23 13-16
September 15	52 1-8	24 1/16
September 16	52 1-8	24 1/16
September 17	52 1-4	24 1/8
September 18	52	24
September 19	52	24
September 21	52 3-8	24 3/16
September 22	52	24
September 23	52	24
September 24	51 7/8	23 15-16
September 25	51 5-8	23 13-16

The production of coke from Connellsville and Lower Connellsville regions, in tons of 2,000 lbs., up to September 5, 1908, was 6,124,278 tons. The largest number of ovens in commission was 18,248 on August 29th. A minimum of 12,610 ovens was recorded for the week ending January 4th. Comparing these figures with the returns for 1907, we find that the output of coke up to September 5th of that year was 13,802,526 tons; the maximum number of ovens, 33,136 in August and September, and the minimum, 31,242 ovens, for the week ending March 28th.

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BRITISH COLUMBIA

The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver, $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals, or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

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Dominion of Canada

Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

N.B.—Unauthorized publication of this advert sement will not be paid for.

The Canadian Miner's Buying Directory.

SEE INDEX TO ADVERTISERS PAGE XXVIII.

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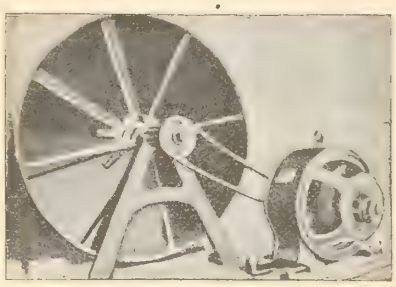
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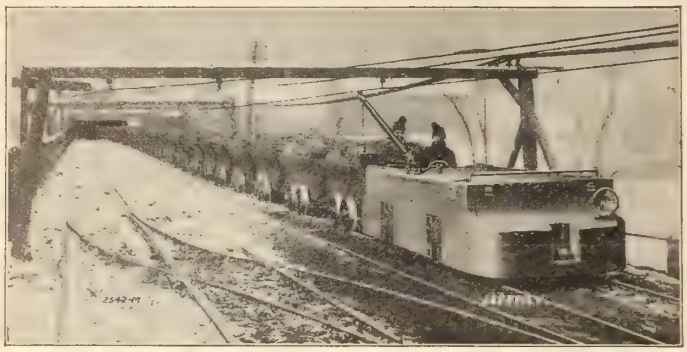
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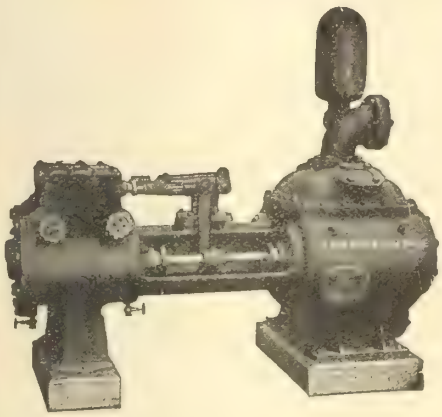
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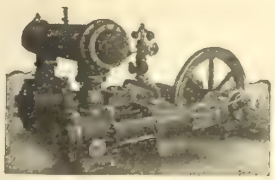
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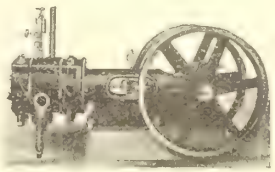
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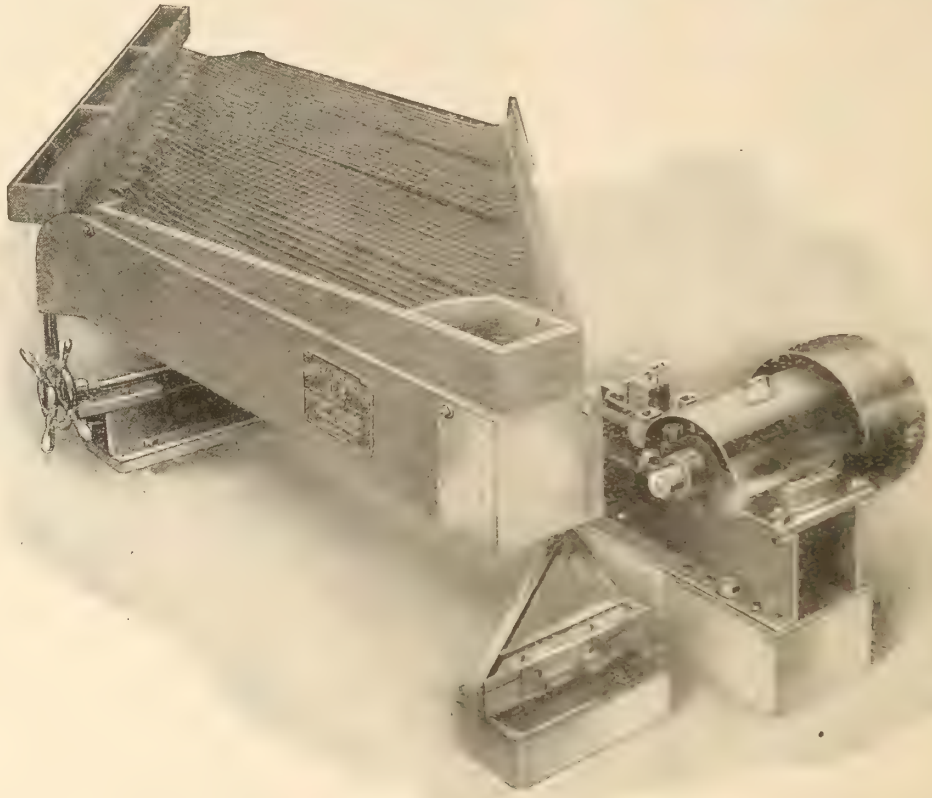
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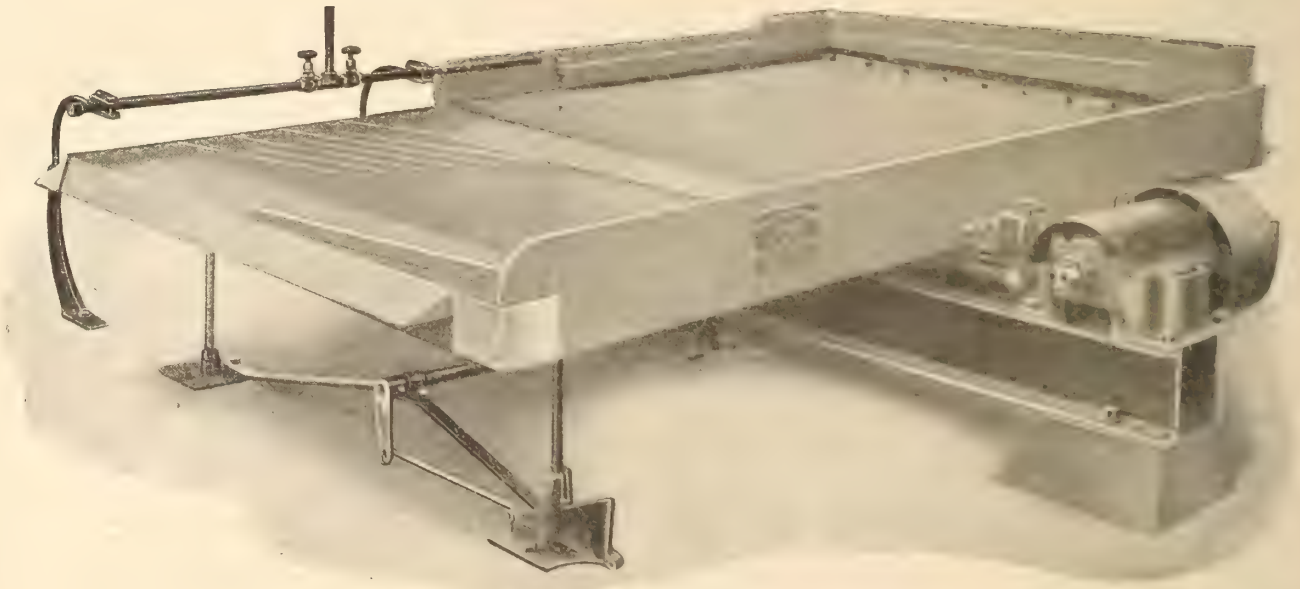
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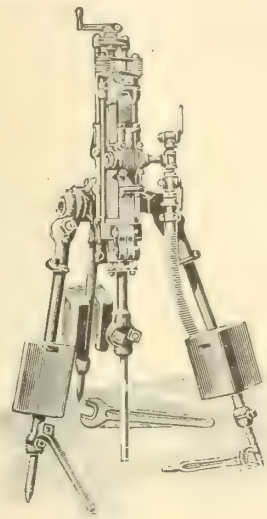


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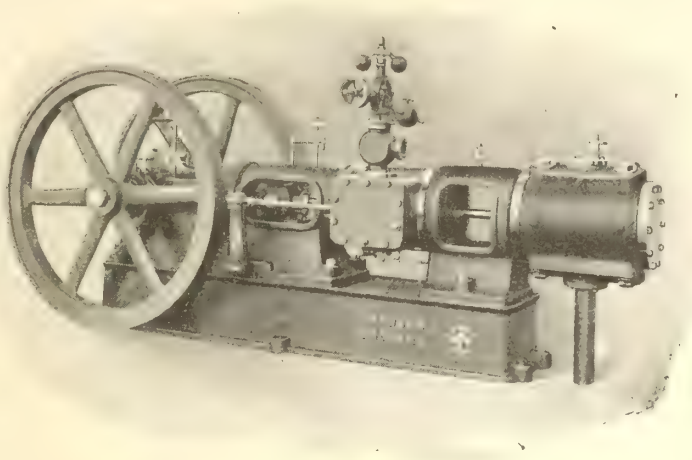
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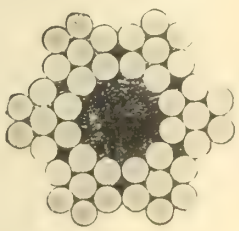
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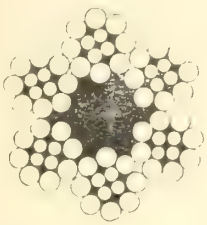
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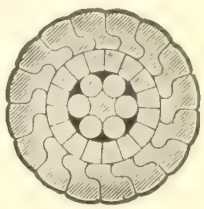
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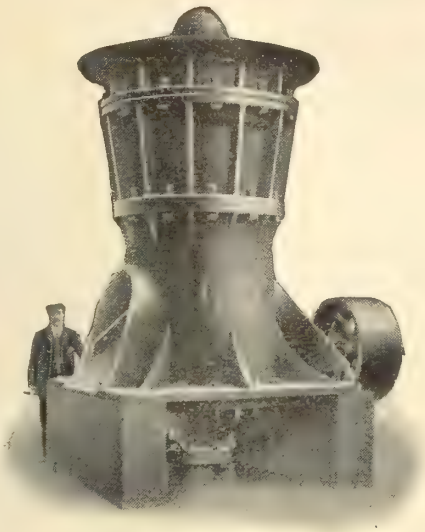
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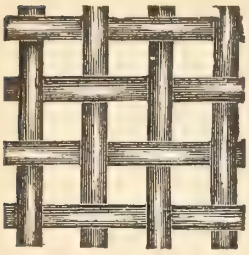
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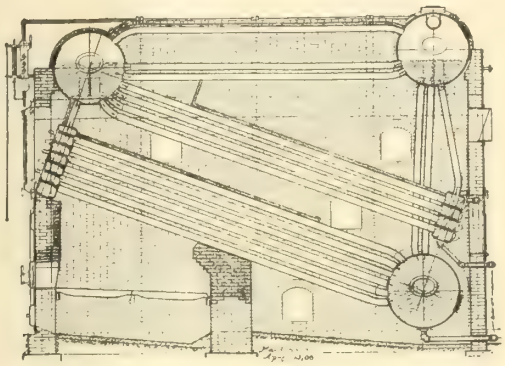
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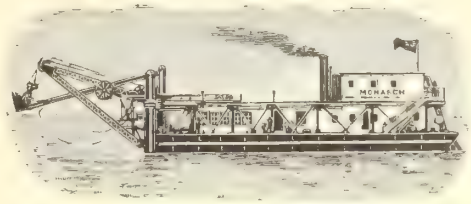
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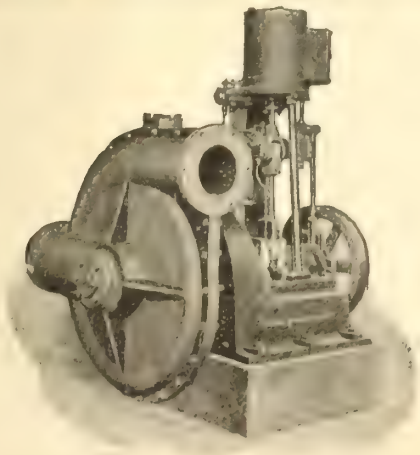
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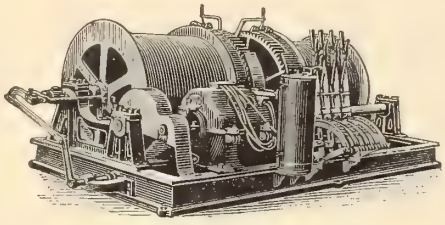
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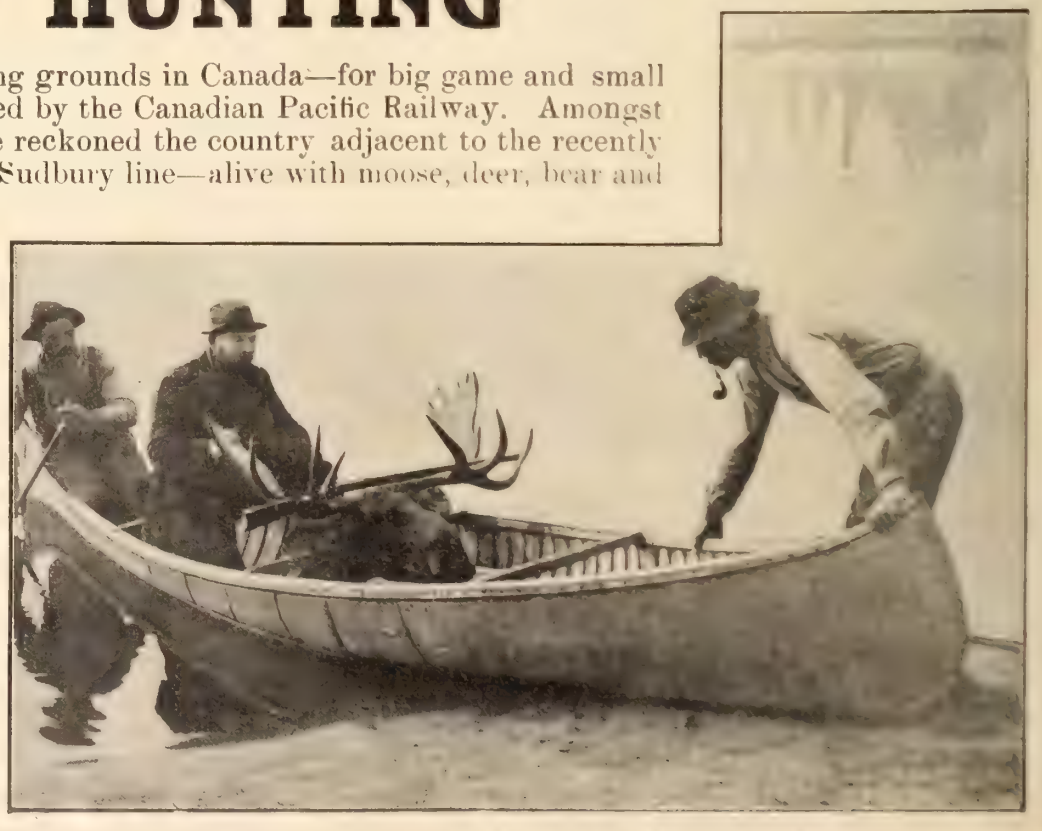
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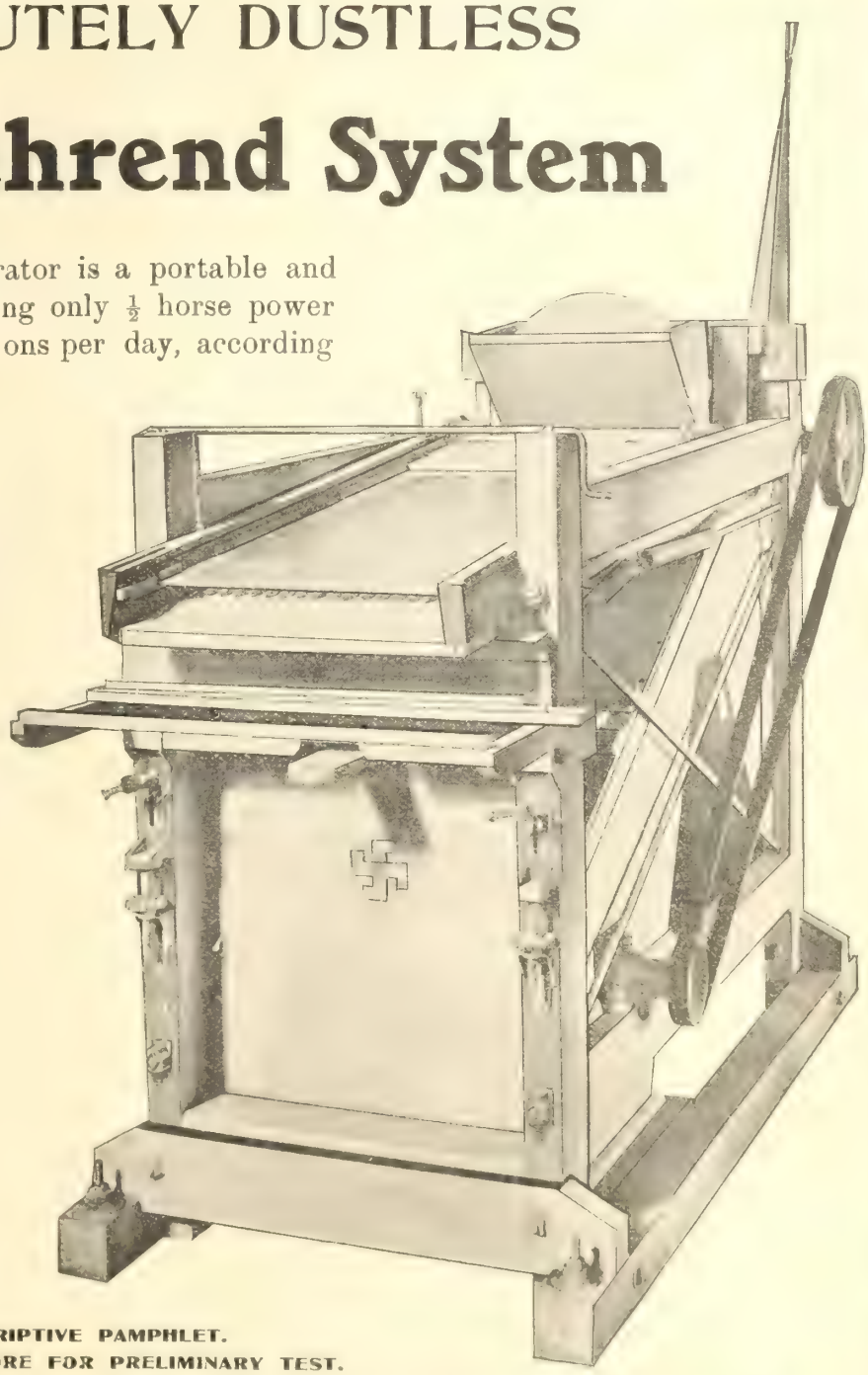
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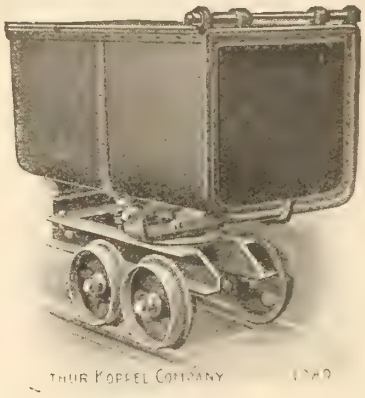
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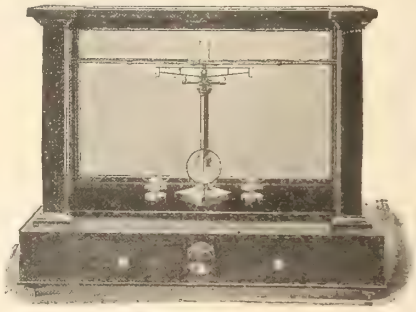
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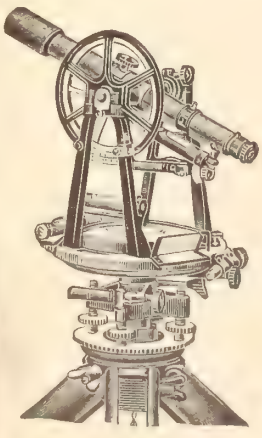
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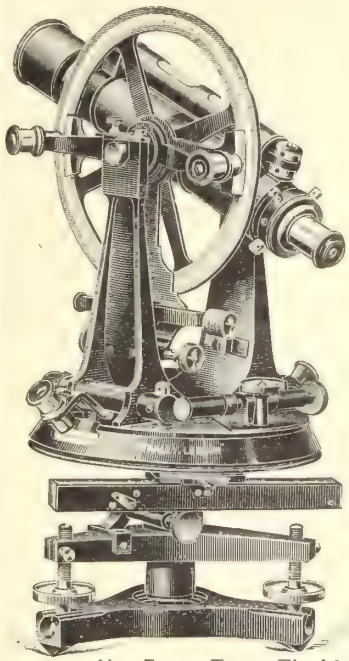
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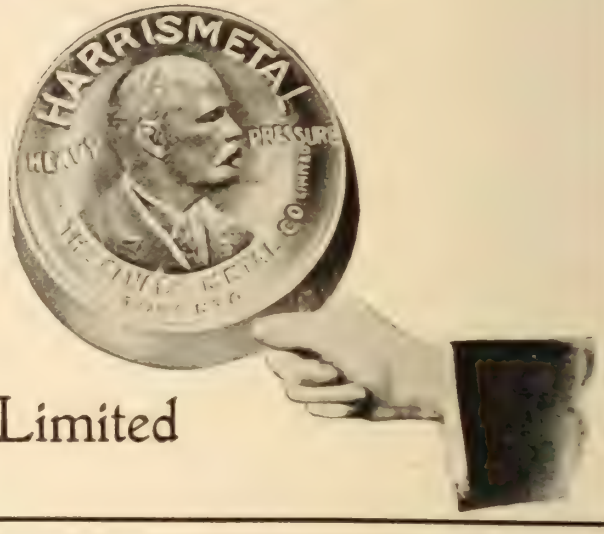
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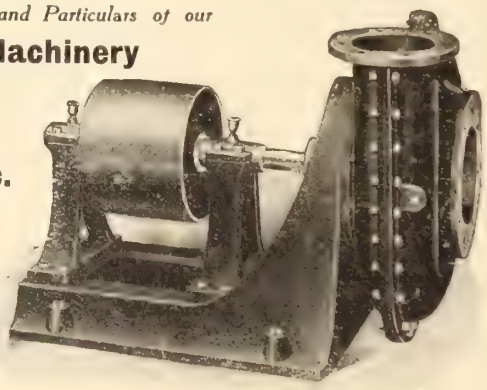


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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO, October 15, 1908 No. 20

The Canadian Mining Journal

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This condition has arisen, no doubt, because of the facts that geology and mineralogy have long been included in the general University curriculum, and not until within comparatively late years has mining been dealt with at all.

But, whatever the cause of this undesirable reversal of usual relations, the effects are evident. Queen's and McGill have more mining students than they can take care of. The University of Toronto is not in the race.

But the fact that the University of Toronto has neglected mining in the past does not prevent her from making a good beginning now. The recent appointment of Mr. H. E. T. Haultain to the chair of mining and metallurgy is a most hopeful symptom. Mr. Haultain is vigorous, competent, and enthusiastic. In the course of his professional career he has worked in many parts of the globe, including Canada and the United States. He has, moreover, the good fortune to be a Canadian.

We take it that the selection of Mr. Haultain to fill this most important chair is merely the first step towards a complete recognition of mining and metallurgy, as the foremost subjects in the curriculum of the School of Practical Science.

In its progress towards the goal of efficiency and practical usefulness, the School of Practical Science may count upon the support of Canadian mining men, and no better means could be desired to secure and retain that support than the appointment of such men as Mr. Haultain.

SPECULATION AND MINING.

Our excellent contemporary, the Mining and Scientific Press, has contracted a habit that is not in keeping with its normal tone of healthy, discriminating, and

alert intelligence. On more than one occasion it has emphasized its belief that mining is essentially speculative. To this belief we taken strong exception. Most of the catastrophes that have marked the history of mining in this and other countries would never have occurred had reasonable precautions been taken to remove the speculative elements in mining investment. It is true that mining promotions, as permitted by the lax administration of laws, or by the absence of a healthy public sentiment, are highly speculative. But it is wholly wrong to characterize the industry of mining as inherently speculative. The properly conducted mining enterprise carries no greater risks than does the ordinary commercial concern. Risks there are, and always will be, in all branches of human activity. Mining risks, sanely controlled, need be no greater than those taken by merchants or manufacturers. But it is illogical to damn mining merely because mining risks are described in different terms and because mining ventures are too often launched by predatory brokers. "Speculative" is a vague word. The Mining and Scientific Press is published in San Francisco. San Francisco was recently destroyed by earthquake. Another earthquake may raze the whole city to-day or to-morrow, or—not until doomsday. This adds an instructively speculative feature to the construction of buildings in San Francisco.

The green-grocer purchases perishable garden truck. He is a loser if he cannot dispose of his purchases within a given time. Millions of dollars are made and lost in gambling in wheat. Yet farming is not described as a speculative calling.

But it is unnecessary to multiply instances. Speculation may be defined as accepting heavy risks in the hope of making great profits. Every industry furnishes opportunity for speculation. No industry is free from the effects of human errors. Strikes and "Acts of God" cannot be foreseen. But it is the business of trained men to estimate possibilities, guard against error, meet competition, and provide for contingencies. In no industry are the rewards of industry, perseverance, and skill so rich as in mining. In no industry is there such utter need to root out the parasitic speculator.

Safeguards are provided for the mining investor. For a relatively small outlay he can ascertain the probable value of a prospect or the minimum value of a mine. He need not look far for honest and competent advisors.

In a word, it is idle and harmful to predicate for mining any higher degree of speculative uncertainty than is manifest in all the ordinary vocations of mankind. Mining should be a "business" in the strictest sense of that word.

A NEW FLOTATION PROCESS.

In our exchange column will be found an extract from a contemporary describing a new concentrating machine, which in simplicity of design is almost revolutionary. The machine is the invention of a Glasgow metallurgist. It consists essentially of a revolving iron tube, the inner side of which is grooved like a bolt-nut. A thin stream of water carries finely-crushed ore through this tube. Here each particle is repeatedly subjected to the surface tension of the water, as the grooved tube revolves. The impermeable sulphides are rapidly surrounded by a supporting envelope of air, and the permeable silicates and other gangue material are penetrated by the water. Thus when the ore enters the discharge apron the sulphides and gangue are completely separated. In practice three or four successive tubes are found necessary.

Unlike other flotation processes, the one in question depends entirely upon the surface tension of water. Neither oil nor chemicals are used.

From results reported it would seem that the new process is to have a large application, especially on the concentration of complex sulphide ores.

COBALT AND THE GLOBE.

Some weeks ago the Toronto Globe published a scathing arraignment of the morals of Cobalt town. Cobalt was condemned utterly by the Globe's sanguinary editor.

Cobalt, as a striving and self-respecting town, resented the Globe's utterances. A Cobalt newspaper demanded an apology from the Globe. No apology was forthcoming.

In this instance the Globe, unable to shift the responsibility of its indiscretion, and unwilling to make proper amends to the citizens of Cobalt, bethought itself of the expedient of using a Saturday supplement in which Cobalt should figure largely. This was done.

Cobalt itself may be left to decide whether this does or does not remove the *casus belli*.

NEW BRUNSWICK OIL SHALES.

The Dominion Government early this summer sent Dr. R. W. Ells, of the Geological Survey, to Scotland with instructions to look into the Scotch oil-shale industry. From the property of the Albertite Oilite and Cannel Coal Co., Limited, a parcel of 42 tons of New Brunswick oil-shale was shipped to Pumpherston, Scotland, for experimental purposes.

Dr. Ells' report is to appear shortly. Meanwhile, from unofficial sources, we are informed that the test was most satisfactory. The Scotch shales, which are the basis of an exceedingly prosperous industry, yield an average per ton of 28 gallons of crude oil and 75 pounds of ammonium sulphate. As compared with these figures the New Brunswick shipment showed a yield per ton of 40 gallons of oil and 75 pounds of ammonium sulphate. This indicates that this comparatively large shipment was richer than the richest Scotch shales.

The property of the company that controls the New Brunswick oil-shale deposits covers 190 square miles in the counties of Westmoreland, Albert and Kings. Seven veins, ranging in thickness from 4 feet to 8 feet, have been opened. They lie between well-defined walls. The

veins show a dip of about 25 degrees N. Their strike is roughly east and west. There is every promise of an enormous supply.

When it is remembered that the Scotch oil-shale companies pay dividends at as high rates as 50 per cent., and, further, that the New Brunswick deposits are probably more workable in every respect than the Scotch, it becomes a matter of wonder that these rich deposits have remained so long unworked.

In a later issue the Canadian Mining Journal will publish a complete account of these Canadian oil-shales.

CORPORATIONS AND POLITICS.

The Nova Scotia Steel and Coal Co. and the Dominion Coal Company have issued a notice to their employees instructing them to refrain from active participation in the canvass at the approaching Federal elections. All officials of the companies are prohibited from using their official positions to influence unduly any voter. The notices state that it is expected and desired that every employee will use his vote according to his convictions.

It is well that large corporations should clear their skirts of complicity in politics. We use the word "complicity" advisedly, for it seems a fitting term as politics are conducted to-day. It is extremely undesirable that corporation officials and their policies should be dragged into the political game. Whenever this has happened the results have been anything but happy.

There are officials, and there always will be officials, who are unable to understand that any power or influence attached to their position, is the power of the corporation, and none of their own. A corporation official is the servant of his employers in his official capacity. In that capacity he may be temporal lord of thousands, but as a citizen he is the possessor of one vote, and nothing more. If he cannot divorce his official power from his position as an elector, he loses, or should lose, his usefulness to the corporation he is supposed to serve.

We think the straightforward pronouncement of the two Cape Breton corporations referred to is in every way commendable.

DOMINION COPPER.

The Dominion Copper Company, successor to the Montreal and Boston Consolidated, has applied for a receivership. Dominion Copper inherited a legacy of trouble from its predecessor. From October, 1907, until July of this year, its mines were closed. This summer, for a period of seven weeks, the plant and mines were active. Failure to make a payment of sixty thousand dollars, due on its sinking fund under terms of a mortgage held by the National Trust Company, is the immediate cause of the receivership.

The Dominion Copper Company is capitalized at $5,000,000, in shares of $5. It has also a bond issue of $1,000,000, only a small amount of which has been retired.

The Dominion owns and operates five mines near Phoenix and Greenwood. It also owns some high-grade gold-silver claims. Its smelter at Boundary Falls has a daily capacity of 800 tons of copper ore.

Its largest mines, the Rawhide and the Brooklyn, are in good condition, and show heavy reserves of fair copper ore. Within the last two years large sums have been expended in plant and mine improvement. At present, therefore, the physical condition of the company's properties is apparently excellent.

Re-organization is to follow. There is every reason to believe that the Dominion Copper Company will soon resume production.

YUKON'S GOLD.

Cheering news comes from the north. Changes and improvements in the methods of hydraulicking have made possible the handling of gravels in greater quantity than heretofore. The enlarged scale upon which dredging is performed makes profitable much gold-bearing material neglected in the past. The season of work has been lengthened, power cheapened, gold recovened, gold recovery gradually improved, until the effects are tangibly expressed in a largely augmented annual gold output.

For 1907 the reported production of gold in the Yukon was $3,150,000. The figures for 1908 will probably exceed $5,000,000.

MOISTURE IN COKE.

The moisture contained in coke is a serious item in metallurgical works. When immersed in water, coke absorbs as much as 35 per cent. of its weight. So pronounced is this hygroscopic power that coke containing 4 to 7 per cent. moisture after quenching often is found to carry 10 to 12 per cent. when received by the purchaser. The absorption depends of course upon the humidity of the atmosphere. But the facts ad luced accentuate the need of great care in quenching.

The production of quicksilver in the United States has been falling off steadily during the past five years. Where there were 20 producing mines in 1904 there are now but ten. During this period the production has decreased from 32,000 flasks of 75 lb., to about 17,000.

The singular phenomenon of hard steel being cut by a rapidly revolving disc of soft steel has been somewhat puzzling. A microscopic examination by an English engineer, F. W. Harbord, has now shown that the metal acted upon is heated nearly or quite to the melting-point of steel, but only at the point of contact with the disc.

The Development of the Lash Process for Making Soft Steel in the Electric Furnace.

In our February 1st, 1908, issue we published a description of the Lash Process for making steel, and outlined in a general way what The Canadian Lash Steel Process Co., Ltd., was undertaking in the way of the development of this process in the electric furnace, and promised our readers a report of the results after



FIG. 1—BUILDINGS—CANADIAN L. S. P. CO.

the plant was in operation. This company having built their plant, and completed their test runs, we give below a description of the same, and the results of these runs. A brief description of the process is as follows:—

The Lash Process consists of making a mixture of concentrated magnetic ores, or iron ore sands, granulated pig iron and carbon, and charging the same into either an electric or open hearth furnace and producing steel. It is not a direct process in the strict sense of the word, but is an ore and pig process, the ore, however, being greatly in excess of the amount of pig iron used, and practically eliminating the scrap, using only such scrap as is made in the regular operation of a steel works.

The amount of pig iron required to make a ton of steel is less than one-half of what is required in regular open hearth practice when the mixture is used in an electric furnace, on account of its non-oxidizing atmosphere; this feature, coupled with the fact that the rest of the mixture is iron ore, which is, of course, the cheapest source of metallic iron, helps to produce a ton of steel ingots at a price much lower than they are produced in regular practice, either in the United States or Canada, figuring the electric power required at its regular market price as sold in large quantities.

Figure No. 1 gives a view of the plant, which is located in Niagara Falls, N.Y., corner 28th Street and Buffalo Avenue.

Figure No. 2 gives a view of the furnace just before starting the plant, which furnace is of the Heroult type of 1,000 horsepower capacity, and is capable of making 4 to 5 tons of steel in one heat.

Figure No. 3 shows the same furnace in operation, and was taken during the making of the twentieth heat.

Figure No. 4 shows the hydraulic tilting mechanism of the furnace, and the back of the furnace in a tilted position while pouring.

Figure No. 5 shows the transformers, which were made by the General Electric Company, and are of 750 k.w. capacity.

Figure No. 6 shows the casting crane with the slag ladle hanging thereon, and a view into the pit, where the casting was done. (All ingots cast at this plant were bottom poured in groups, and were 6x6 inches square, weighing on an average 500 pounds each.)

Figure No. 7 shows the mixing plant, in which the material was mixed that was charged into the furnace, the ore, granulated pig iron or cast iron borings, and carbon in the form of coke, charcoal or anthracite caol, being put into this plant and thoroughly mixed with a small proportion of slacked lime, the slacked lime being used to keep the material in bond.

The operation of this plant was as follows: A mixture of 67 per cent. of magnetic iron ore, 23 per cent. of cast iron borings or granulated pig iron, 10 per cent. of coke dust was put into the mixing pan in batches of about 500 pounds and allowed to thoroughly mix for 10 or 15 minutes, when about 4 per cent. of the slacked lime was added. After this material was thoroughly mixed and a sufficient quantity had been accumulated, a sufficient amount of the same to make 4 tons of steel was charged into the electric furnace; about 100 pounds of steel scrap was scattered over the top of the same, and a small bar was put into the furnace to form an arc for the electrodes; the electrodes were then lowered into



FIG. 2—ELECTRIC FURNACE 1,000 H.P. CAPACITY.

position, the current turned on, the furnace closed up tight, and the entire batch of material was melted. After the same was thoroughly melted, the slag was poured off into the slag ladle, and a refining slag put into the furnace for the final refining of the metal; on completion of this operation, the metal was poured into

the casting ladle, thoroughly draining the furnace, and then cast into ingots, when the next charge was added and the operation repeated as described above.

A full report describing the entire operation at this plant of all the heats made would be very lengthy.



Fig. 3—Furnace in Operation.

During the making of the first ten or twelve heats no attention was paid to getting definite results, but the first runs were for the purpose of familiarizing the men with the process and the furnace operation, and also to ascertain the best methods of charging, refining, etc.

Some of these heats were made with the material in the form of bricks, which were being preheated in the stack of the furnace before charging, and while this method did not give the best results in every respect, it is believed that the future operation of a large plant would be along these lines, or along the lines of preheating the mixture without briquetting, because from a theoretical standpoint, this method is ideal, making use, as it does, of the waste heat of the furnace for a partial reduction of the material.

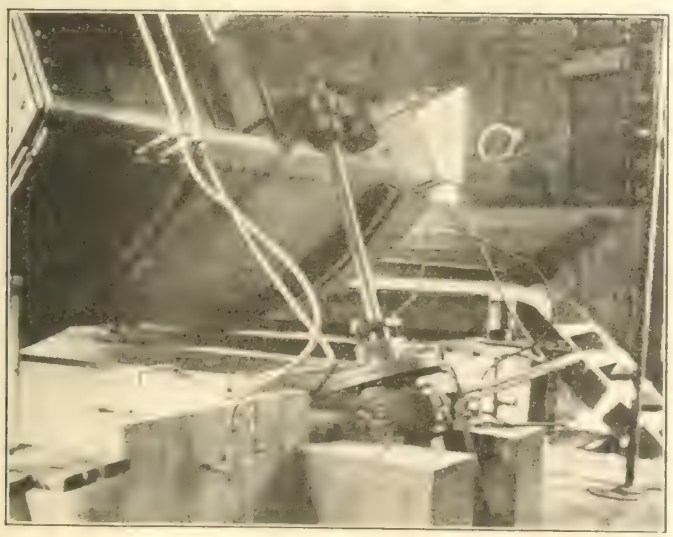


Fig. 4—Furnace Tipping Arrangement.

The best results obtained came from the method of charging loose material into the furnace in bulk; these results proved beyond a doubt the commercial possibility of the process for making steel from a mixture in which a large quantity of ore is used, and it leaves the possibility for still better records, when proper arrangements are made for a preliminary treatment of this mixture by the waste heat of the furnace before charging.

An average of the second half of the run in which the material was charged in bulk, as above described, gave a result that proves conclusively that one gross ton of steel can be easily made for one-quarter of an electric horsepower year.

An average of the same heat proved that the electrode consumption would be less than 50 pounds of electrodes per gross ton, and the yield of the metallic contents charged into the furnace, owing to its non-oxidizing atmosphere, is better than that obtained in the regular open hearth practice.

In making steel by this process, and laying aside entirely the fact that it is a commercial proposition, owing to the low cost of production, the results obtained in the quality of steel made were more than satisfactory. It must be borne in mind that the largest part of the material from which this steel is made is iron in its native state, in the form of ore, and that when this material is mixed with granulated pig iron all of the metallic contents come direct from the native

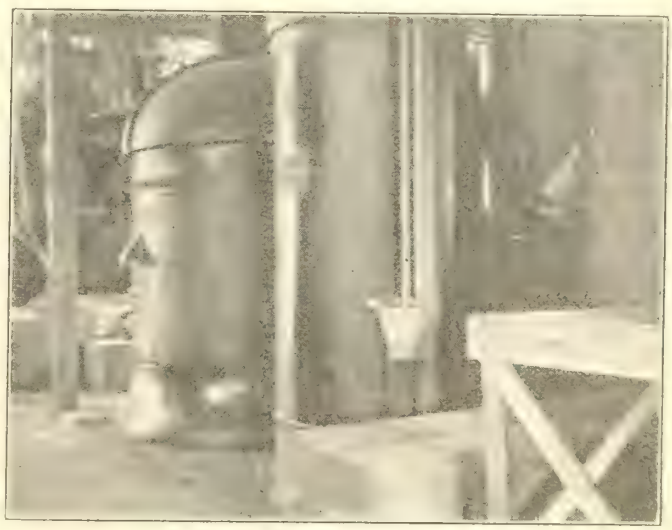


Fig. 5—Transformer Room.

iron. The physical qualities of the steel thus made are in every respect superior to steel made by the regular process of scrap and pig, even when the chemical analyses are about the same.

Then the high heat in the electric furnace permits of a better condition for refining and pouring. In a number of heats made at this plant, in which the sulphur and phosphorus in the mixture were above 0.2, these in the steel were almost eliminated, a result that it would be impossible to bring about in the regular open hearth practice.

Mr. Horace W. Lash, the president of The Canadian Lash Steel Process Co., Ltd., is a steelmaker of national reputation, and for years has been closely associated with the steelmaking world; he is vice-president of the Garrett-Cromwell Engineering Co., of Cleveland, Ohio, Mr. Lash has spent four years perfecting this process in an experimental way before these tests were made, and the results of the tests have proven beyond a doubt that the Lash process is in every respect a commercial proposition. Particularly is this so for Canada, which country is greatly blessed with numerous water powers, and an abundance of magnetic iron ore, which

is just what this process requires for its development.

The tests at this plant were under the supervision of Messrs. FitzGerald & Bennie, of Niagara Falls, N.Y., and Mr. Robert Turnbull, of St. Catharines, Ont. Messrs. FitzGerald & Bennie and Mr. Turnbull stand high in their profession of metallurgical and electrical experts, and the greatest care was exercised on their part to obtain accurate results.

We quote the following from Messrs. FitzGerald & Bennie's report:—

"In a general consideration of the electric furnace experiments there is reason to be satisfied. So far as the power consumption is concerned, the results obtained show that no difficulty in reaching a power consumption of one-quarter horsepower year per ton of steel produced need be expected. The only serious problem which we have been faced with in the experiments is that of electrode consumption. However, if the conditions of the experiments are considered, there



Fig. 6—Casting Crane

is reason to believe that this difficulty may be met successfully. There is one other point to be noted in this connection. The Lash process so far has been tried only in the Heroult furnace, where carbon electrodes are used, and this difficulty would not have to be faced in the induction furnace of the Rochling-Rodenhauser design."

Over $30,000 was spent by The Canadian Lash Steel Process Co., Ltd., in building this plant, and conducting these tests, and the results have brought forth conclusively the following:—

First—That cheaper steel can be made by this process than by the regular open hearth practice owing to the reduction in the amount of pig iron required, and the fact that the rest of the metallic content is in the form of ore, which is iron in its cheapest state. To anyone familiar with the steel trade, this cost can be easily figured when the cost of ore, pig iron, carbon in any form, and water power is known. On $3 ore, $18 pig iron, and $15 power, ingots can be made for less than the cost of the pig iron.

Second—The quality of the steel is very much better, owing to the material in the charge coming direct from its native condition.



Fig. 7—Mixing Plant

Third—The control of the heats and temperatures is absolute, and the trouble due to impurities in fuel is eliminated.

Fourth—The carbon content of the bath can be brought under absolute control, as it is only necessary to slightly vary the mixture to bring out any carbon content desired.

Fifth—The cost of building a plant of a given capacity is much less than a plant for regular open hearth practice on account of the elimination of all producers, checker work, underground flues, etc., the electric furnace being nothing more than a large-sized lined ladle.

Sixth—The attendance required should be less, as the material is simply charged into the furnace, the



The S. Bell Yard

furnace is closed up tight, and the power applied. Owing to the character of the material that is charged, and the electrical control of the operation, no attendance is required until the melt is made. It therefore becomes a mechanical proposition throughout, in which the materials are all handled by machinery, and the furnace is self-regulating. It is possible to charge a

large size furnace in less than two minutes. These facts, when compared with the pig and scrap proposition, which takes considerable labor to handle, are apparent to those familiar with the steel business.

Seventh—The cost of refractories, repairs, etc., will be very much less, and there should be no interruption to continuous operation of a plant, because a complete furnace fully lined, ready to go into operation, can be kept as a spare, and with the proper crane arrangements can be set in the place of the furnace needing repairs, which furnace can be taken to another building for this purpose. Therefore, it is apparent that the cost, and care of checker work, producers, flues, etc., are entirely eliminated. Owing to the construction of the electric furnace the roof is very much stronger and better maintained.

Finally—The control of the heat for the elimination of impurities, and the handling of the steel, and the fact that the amount of impurities charged into the furnace is always known, gives a condition for the making of high-grade material that cannot be obtained by any other known process.

BATTERY AND CYANIDE GOLD SMELTING.

By A. Thomas (Member).

(Paper read before the C. M. and M. Society of South Africa.)

As it is some time since the subject of gold smelting has been discussed by this Society, the following notes are written with the object of giving a brief outline of some present practices, and of providing an opportunity during discussion, for members to bring forward other methods at present in vogue.

The separation of the mercury from the gold is done in cylindrical retorts, made of cast steel, measuring 53 in. long, 12 in. in diameter, and 1½ in. thick. The retorts rest on two water cooled bearers, with the usual water jacketed condenser for the mercury fumes. The flue of a retort furnace has three openings, measuring 11 in. x 8 in, arranged above the retort one over each end, and the other over the centre, thereby insuring a uniform temperature over the whole body of the retorts. This arrangement of the flue is necessary, as with the single flue retort furnace one part of the retort is generally heated too strongly, whilst other parts are insufficiently heated to volatilize the mercury completely. The capacity of this retort is 5,000 oz. of amalgam, and in charging, semi-circular trays are used. These are white-washed inside before receiving the amalgam, and care is taken not to fill the trays too full. The doors of the retort are sealed with a joint made of asbestos cord soaked in water. As soon as the mercury begins to come through the condenser the fire is checked and a uniform temperature maintained for about two hours, or until the mercury ceases to come off. The temperature is then raised to expel the remainder of the mercury.

If the temperature is too high in the early stages of retorting, the distillation will be too violent, and sputtering of amalgam in the retort is likely to ensue. The time required for retorting is from 4 to 4½ hours.

After removal from the trays, the gold is weighed into 1,000 oz. lots and smelted in No. 40 plumbago crucibles; a little borax is added as the gold melts down, but this is removed by skimming, after being thickened by the addition of a little fine sand. The bullion is afterwards cast into bars, which show a loss in weight of about .72 per cent. on the retorted gold. The mercury is afterwards weighed and returned to the mill. The difference between the weight of the amalgam charged into the retort and the weight of gold and mercury recovered is about .14 per cent. on weight of amalgam. Several assays of the retorted mercury have been made, and in each case only a trace of gold found. The coal consumption for retorting 5,000 oz. of amalgam is about 350 lb.

The fire boxes used for calcining the zinc gold slimes are rectangular in shape, measuring 44 in. x 22 in. A tray made of 2 in. cast-iron with three sides turned up 1½ in. is placed over the fire box. The trays in which the slimes are calcined are placed over these furnaces and are made of ⅛ in. mild steel, 48 in. long, 26 in. wide and 8 in. deep. Before receiving the slimes these trays are white-washed, as this prolongs their life and prevents the slimes from adhering to the bottoms, especially if the temperature has been too high during the calcination process. Great care must be taken in carrying out the calcination, as upon this the success of the smelting operation depends. The temperature is kept low at first and gradually raised as the operation proceeds. As a rule, about three hours is required for a successful calcination. The usual loss on this operation is about 42.4 per cent. of the original weight. Tests seem, however, to show that the bulk of the loss is due to moisture, which may run up to as much as 38 per cent., the remaining 4 per cent. may be due to the removal of carbonaceous matter, and other changes, which may cause a loss of weight. A curious feature of the calcined slimes is the presence of a purple color, which would seem, though I am not positive on the point, to vary in intensity in proportion to the richness of the slimes. Acording to Muller (see Metallurgy of Gold, by T. K. Rose, p. 35), gold in a very finely divided state gives a purple color i nthe presence of alkalies and alkaline earths, and it may be that this purple color is the same as mentioned by Muller. On completion of the calcination the tray is removed from the furnace, and when cool, taken to an enclosed room, where the calcined slimes are weighed and fluxed. Every precaution should be taken at this stage to avoid unnecessary handling and consequent dusting of the slimes.

The fluxing is carried out as follows:—The calcined slimes, which are more or less caked, are weighed direct from the trays without any grinding whatever. Plumbago crucibles No. 100 with clay liners are used for smelting. The slimes are weighed and placed in the pots with the required amount of manganese dioxide The pots are only filled to within 4 1-2 to 5 inches from the top, the rest of the space being used for the other fluxes, composed of borax and silica, old crushed liners being used as a source of silica. The following may be taken as a representative charge: Calcined slimes, 100 parts; manganese dioxide, 7.5 to 10 parts; crushed liners, 25 parts; fused borax, 20 to 25 parts.

Naturally, the flux is used within certain limits, according to the quality and physical features of the slimes after calcination. All new plumbago crucibles are subjected to a preliminary treatment before use, thus increasing their life to a considerable extent. The treatment is as follows:—They are placed in the furnace and heated for 30 minutes, to remove the glaze, after cooling they are placed for 45 minutes in a saturated solution of borax, and are afterwards dusted over with powdered borax and placed over the calcining furnace to dry, and when dry, reheated in the reverberatory furnace until the borax fuses. New clay liners, whenever possible, are used in the first charge of the smelt. This obviates the necessity of suddenly subjecting them to the high temperature of the furnace prevailing with subsequent charges.

A type of furnace which, with a few slight alterations, would be quite suitable for this work, is the old reverberatory pan furnace, known locally as the Tavener furnace; one point I may mention in connection with furnaces used for smelting rich gold bearing materials, is the lack of proper condensing chambers in the flues. I am convinced that some kind of condensing chamber is necessary and should be attached to all furnaces smelting finely divided and rich product, such as cyanide gold slimes. Even with all the precautions that can be taken in fluxing, such as using a borax cover, or placing covers on the pots, I have every reason to believe that gold is carried off to the flue, both mechanically and by volatilization.

The buttons of gold obtained from the fusion are usually of high grade, and ready for casting into bars. Occasionally, a thin skin of matte may appear on a few of the buttons, and when this occurs they are arranged so that those with the matte are placed in the same crucible as the highest grade button of the smelt, thus averaging up the fineness in the bars. No attempt is made to desulphurize the matte in smelting, but this is skimmed off and kept for future treatment with the bye-products in the pan furnace, where it will be desulphurized with battery screens. This matte generally occurs in case of cracked liners when the slag comes in contact with the graphite crucibles. My experience goes to show that to a very large extent the fineness of the bullion produced on these fields depends mainly on good calcination. Perfect calcination has two other great advantages, firstly, by reducing the bulk of the material; secondly, by perfect oxidation of the base metals, doing away with the necessity of using a large quantity of oxidizer in fluxing, thus reducing the value driven into the slag—particularly of the silver.

For very base bullion, owing to the presence of metallic lead and copper, I find that cupellation with clean lead is the only satisfactory method of bringing up the grade. This, however, should not be necessary on these fields, as low grade bullion is rare and unnecessary.

In casting cyanide bars it is usual to keep their weight in the neighborhood of 700 oz. A point that has often been raised on these fields, is to what degree of fineness should bullion be brought. At present we have all kinds of pains and penalties to avoid at the hands of the refiners in London. This seems rather extraordinary when we consider the tonnage, for that is what it amounts to, of the gold we turn out. A mine that refines its gold up to over 900 parts per 1,000 fine receives no better terms than one which just reaches the mark of 900 gold and silver. There is no doubt that every penny we spend on refining our bullion beyond the point necessary to escape the penalties, is to my mind, unnecessary. The present system is certainly not satisfactory, and would bear thorough investigation at the hands of those who have the disposing of the gold on behalf of the mines.

Another point also suggests itself, why should we ship all our bullion home for refining? I can see no reason why a refinery should not be established on these fields. The technical part of the work can be successfully carried out here, but I will leave the discussion of the financial side of this question to members who may have more data at their disposal.

For the treatment of bye-product many mines are equipped with the usual kind of reverberatory pan furnace. As the construction of the furnace is the main factor which governs efficiency and working costs. I give the following dimensions of a furnace of this kind, hoping they may be of use to some of the members.

The pan in which the furnace hearth is built is made of ½ in. iron, measuring 9 ft. x 6 ft. with a depth of 24 in.:—

Size of grate in fire box, 3 ft. 6 in. x 3 ft.; from fire box of grate to top of roof, 2 ft. 4 in.; top of bridge wall to roof, 11½ in.; size of furnace hearth, 7 ft. 6 in. x 3 ft. 6 in:; bridge end of hearth to roof, 2 ft. 5¾ in.; centre of hearth to roof, 2 ft. 6 in.; lowest point of roof to hearth, 1 ft. 7 in.; the hearth of the furnace has a fall from all points to tap hole of 3½ in. to 1½ in.; uptake flue from furnace, 2 ft 6 in. x 9 in.; capacity of furnace for lead bullion 4,200 lb.=61,268 oz. troy.

The bye-products consist of the slag from the smelting of gold zinc slimes in the reverberatory pan furnace, ground up crucibles, liners, etc. In treating these bye-products, the aim is to produce a liquid slag of low specific gravity, and thus reduce as much lead as possible from the materials treated. This is done by the addition of metallic iron in the form of battery screens. As a precaution against any residual high values of the precious metal in slag, the charge, prior to withdrawing the slag, is given a wash down with litharge and coal dust.

All variations in the charges smelted are regulated by experience. It would be very interesting to know by analysis the exact composition of the slag and other materials to be treated and so be able to flux from a theoretical standpoint. However, as these parcels of slag and other bye-products are not very large, and the composition of them varies from time to time, an analysis would not furnish any definite information for the treatment of future bye-products.

The present method is crude, but the value of the residual slags shows that the results are satisfactory. Naturally, this method is only applicable in a case similar to the one we are dealing with, because fully 90 per cent. of the material treated has already been fluxed, and merely requires re-smelting and reduction of the metals. The principal material to be smelted being the slag from the zinc slimes smelt, this is always taken as a base from which to work. When there is a large quantity of refractory materials to be smelted, it is worked off in small lots. Should these present any difficulty, the amount of assay slag usually added to the charge is slightly increased, ground up liners, or any other gold bearing silicious material is added in small lots to each charge, as the slag from the cyanide smelt is nearly always basic, and some protection is need for the furnace lining.

In commencing a smelt, a few bars of lead are

placed in the furnace, so as to form a bath, and prevent the slag from corroding the bottom of the furnace. The first charge is made up and its behavior in the furnace carefully noted, so that any defects may be remedied in the succeeding charges. It is sometimes found necessary to return the slag to the furnace for re-treatment on account of the high values contained therein. The following is a brief account of a bye-product smelt.

Amongst the materials treated were, reverberatory pan furnace slag, bullion furnace ashes, extractor house sweepings, old cupels, brick from furnace bottoms, calcining trays, battery screens, elephant cord from battery, assay slag, etc.

The mixture was made up into 14 charges of about 900 lb. each, and contained 9 per cent. lithage and 5.5 per cent. iron, in the form of battery screen and old calcining trays.

The average value of the slag drawn off, assayed as follows:—

Gold, 3.99 dwt. per ton; silver, 337.59 dwt. per ton; lead, 6.5 per cent.

The weight of lead bullion recovered = 19,143 oz. troy. The total litharge added only accounts for 12,-711 oz,. thus showing a gain of 6,432 oz. After deducting 797 oz., the weight of the gold and silver recovered by cupellation, there remains a surplus of 5,635 oz. of lead, which has been recovered from the material treated.

In this smelt the last few pots of slag drawn off are put aside for treatment in the next smelt, since fine shots of lead may be skimmed off. Before tapping the lead bullion off, the metallic lead is concentrated and purified by oxidation and the dross afterwards taken off. In this particular smelt the dross carried 28 per cent. metallic copper, the remainder being oxide of lead and finer shots of metallic lead. The cupel used in this smelt was made of bone ash, manufactured on the mine. The bones were collected from the kitchen at the native compound, and burnt in the cupel furnace, an iron plate being inserted on the cupel so as to form a bottom for the furnace. The burning presented no difficulty, and the calcination was complete in four hours. It is most important that the bones should be completely burned, so as to expel all animal and carbonaceous matter. The loss in weight during calcination is about 54 per cent. The bone ash obtained was equally as good, if not better than than the imported article, at less than half the cost. In preparing the bone ash for making the test, I used 14 lb. caustic potash in solution to 400 lb. bone ash with satisfactory results.

In presenting these brief notes I do so with the hope that the members engaged in this class of work will raise a discussion which will serve to bring forward a few of the newer innovations in smelting on these fields, and so bring our published information up to date.

Coal Washing as Practised by the Nova Scotia Steel and Coal Company, at Sydney Mines, Cape Breton, N.S.

From Transactions of the Canadian Society of Civil Engineers.

By C. L. Cantley, Stud. Can. Soc., C.E.

The cleansing of coal to fit it for metallurgical purposes is a branch of the art and science of ore dressing which has become prominent only at a comparatively recent date in America. The reasons for this are quickly brought to mind when we remember the growing scarcity of pure fuel and the refinements of metallurgical methods which now make fuel treatment necessary, except where Nature has been especially kind to the metallurgist.

In Canada, the greater part of our fuel is not sufficiently pure for the economical smelting of iron, and hence it was that one of the first coal washers to be built and operated in America was laid down in 1892 at Ferrona, Nova Scotia, by the New Glasgow Iron, Coal & Railway Company, at that date a constituent of a company which afterwards became the title company.

The success obtained on the product of the neighboring mines induced Mr. Graham Fraser, at that time managing director of the Nova Scotia Steel & Forge Company, to carry out a series of experiments in and about the year 1894 on other Nova Scotia coals, and especially to test the coals of Eastern Cape Breton with a view of seeing whether a good enough coke could be made to warrant the establishment of an iron and steel industry on that island.

The experiments proved conclusively that by this method of treatment coals containing a high percentage of ash and sulphur could be so prepared as to make a coke of good quality, at atreatment cost not exceeding ten cents per ton, and it is largely to these successful tests we owe the establishment of the iron and steel industry of Cape Breton.

Thus we see, from the outset, the fundamental importance of this branch of ore dressing which has made possible one of the greatest industries in Eastern Canada; this is further emphasized by the recent troubles in Canadian steel-coal circles brought about by coal being supplied which, it was claimed, could not be sufficiently purified by washing to make good metallurgical coke.

The Nova Scotia Steel & Coal Company in 1896 purchased the entire property of the General Mining Association of London, which operated the well-known "Old Sydney" main seam in Sydney Mines, Cape Breton. The intention then was to utilize part of the coal mined for the manufacture of coke to be used in iron blast furnaces, and in 1899 the plant described in this paper was laid down at the colliery, the general scheme being similar to that of the plant previously erected at Ferrona. As originally designed, by Stein & Boericke, metallurgical engineers of Philadelphia, and erected, the plant was expected to handle 300 tons of coal per day of ten hours. It has, however, been much altered in details, chiefly of elevators and waste disposal, so as to have a uniform washing capacity throughout, and, as a consequence, the output is now over 500 tons per day.

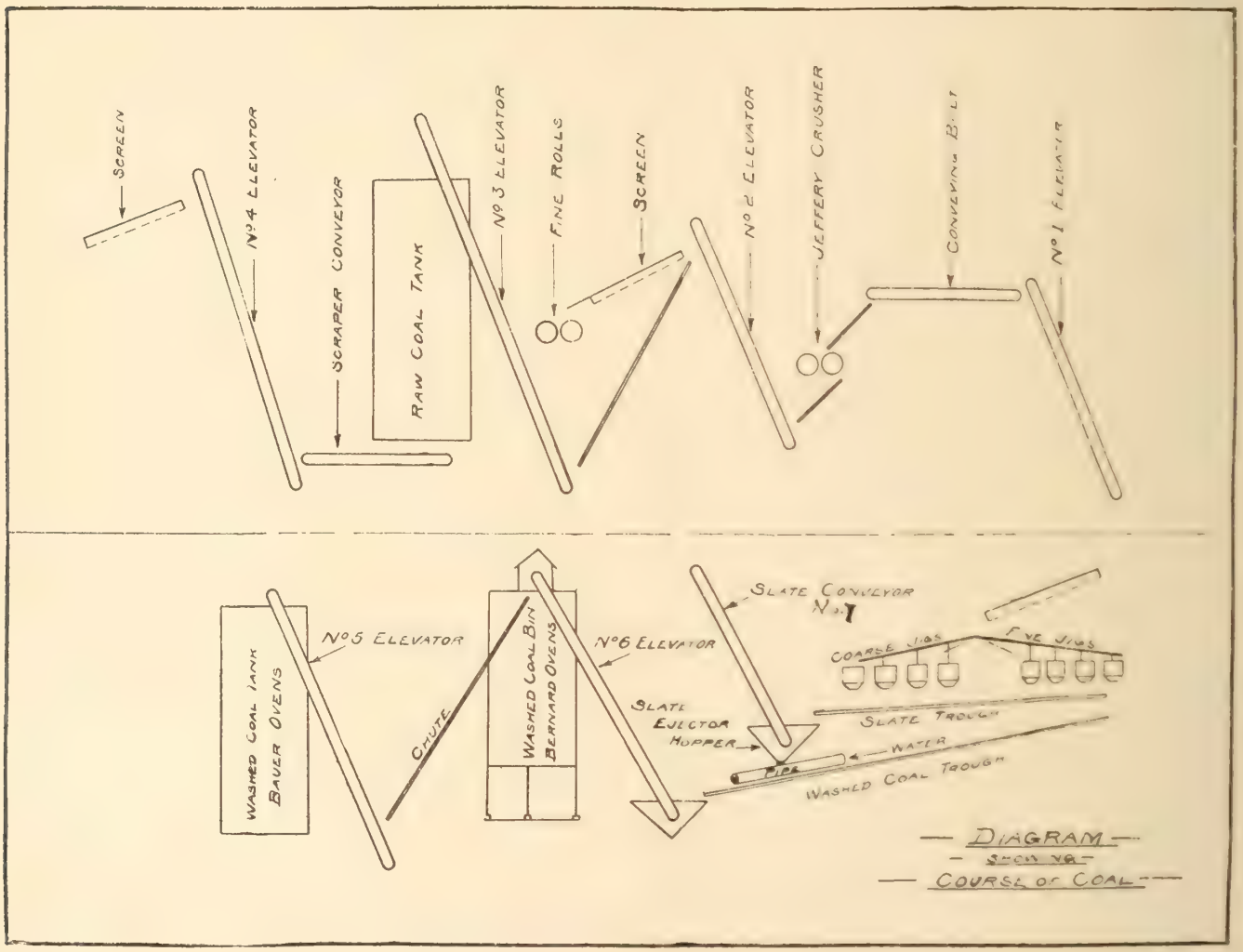
The plant is situated in the immediate vicinity of the

colliery, from which it formerly drew all its coals. Now, however, the coals treated are screenings collected in cars from several collieries, and are what is locally known as culm or duff, that is to say, the screenings removed from the run of mine coal as prepared for the market. These screenings include practically all the fire-clay contained in the clay parting between the coal seam and the roof and the foot wall. The undercutting being in the clay-band next the foot wall, the proportion of ash in these screenings is from two to three times as great as in the seam coal proper.

An outline of the whole process is shown in the appended sketch.

The cars of screenings are emptied, as required, into No. 1 elevator pit, and the coal is lifted by bucket elevator to a Robins belt conveyor, which carries it 135 feet, over sidings, to the breaker house, where it is lowered by chute to a modified type of Jeffery rolls. These rolls are 24 inches in diameter, and turn at 180 and 270 revolutions, respectively, per minute in opposite directions. The original rolls (the frame being of cast iron) were designed with one roll stationary and the other adjustable, the adjustable roll being held within a half inch of the other by means of a counter weight acting through a toggle joint applied to each bearing of the moveable roll, it being necessary to have one adjustable on account of foreign material, such as bolts, spikes, etc., finding their way into them with the coal.

While the toggle joints gave very good results for small pieces of iron and rock, they would not allow the rolls to open up quickly enough to pass a two-inch machine pick, and this caused frequent breakages of the roll frame. To overcome this trouble the cast iron frame was discarded and the original rolls, bearings, and toggle joints were mounted in a frame consisting of two steel channel irons on each side, with a top and bottom cover plate, forming a box girder; to this girder is fastened, on each end, cast steel pedestals to receive the bearings, these last being held to the girder by means of four three quarter-inch machine bolts. The effect of this construction is that when a machine pick passes through the rolls, and the toggle joint does not act quickly enough, the four three-quarter-inch bolts, holding the pedestals to the girder frame, are sheared off, allowing the rolls to separate and causing no other damage than the loss of the four bolts, which are easily replaced, and the machine put in running order again.



The product is elevated by No. 2 elevator and deposited on a shaking screen with half-inch perforations. The screenings fall directly to No. 3 elevator pit; all portions larger than half-inch going over the screen into plain rolls, 16 inches in diameter, and running at 80 revolutions per minute, and thence to No. 3 elevator pit. From here all the coal of half-inch diameter and under is elevated by No. 3 elevator to the raw coal storage tank, which is built of steel, brick lined. This storage tank is self-trimming, and holds 1,000 tons, a fea-

ture which permits a supply of crushed coal to be kept one day ahead. Thus the washer proper is enabled to run on a day when the collieries are idle. The bottom of the tank is designed with two rows of parallel openings, fitted with sliding covers, each in line with a horizontal scraper conveyor delivering the crushed coal to the foot of No. 4 elevator, which delivers it in turn upon the shaking screen. This last has three-eighth-inch perforations, and being set at an angle of about 15 degrees, is supported upon rocker arms, and has an eccentric motion closely resembling that of hand screening. Owing, however, to the fine coal being more or less damp, it is impossible to separate the two sizes on a dry screen, so that, as the coal is delivered to the screen, it is met with a number of jets of water, which flush the coal through the screen plates. When the screen was flushed with the ordinary coal washing water the perforations in the jet pipes became plugged up, consequently clear water has to be used, and a cheap and convenient supply is found in the circulating water from a surface condenser, connected to the main centrifugal pump engine; this water being warm, is less trying for the jig tenders, who have their hands immersed continually. The combined effect then of the incline and the supply of water is to rapidly flush away by flume those screenings under three-eighth-inch to the fine jigs. The remainder, under half-inch and greater than three-eighth-inch, being sluiced to the coarse jigs.

There are four coarse jigs on one side of the building, and as many fine ones on the other, all of them being essentially modifications of the Luhrig jig, and designed especially for coal washing work by Mr. Stein, the engineer whose firm had charge of the erection of the plant. The fine jigs, styled "Standard two-compartment finecorn jig" by the designer, are built of wood, and wash 7½ tons of coal per hour.

Thus about 65 per cent. of the coal is washed by the fine jigs, since only three of the coarse jigs, with a capacity of six tons per hour each, are used at a time. The fine jigs, which have one compartment fitted with quarter-inch perforated plates, and the other with three-eighth-inch perforated plates, are run at 135 pulsations per minute. The feldspar used in the bed is of five-eighth-inch cubes. The coarse jigs are run at 72 pulsations per minute, and have a bed of seven-eighth-inch feldspar varying from 2 to 4 inches in thickness, depending on the amount of slate flowing. The purified product from the jigs is sluiced to the washed coal bin, while the slate runs to a waste bin, from which it is removed by No. 7 elevator to the slate bin in a storage tower, or flushed away by the slate ejector.

The water from both these bins, carrying in suspension certain fine coal and extremely fine particles of slate, returns to the sludge tank, directly under the jigs. There this fine material settles, and at proper intervals is drawn off. This tank, being the reservoir to which all leakages drain, also acts as a sump for the washer, and the centrifugal circulating pump drawing from it uses the water over and over again. Thus the only loss of water is that caried away by the products as moisture, a small amount as leakage, and that used for flushing purposes. This amounts, in all, to about 25 per cent. by weight of the coal washed.

The washed coal is all elevated to a drainage and storage tower by No. 6 elevator, which is equipped with perforated buckets, as also are the elevators Nos. 5 and 7, and the amount required for the coke ovens located nearby is lowered by chute and re-elevated by No. 5 elevator to another tower. This additional handling is found to pay, owing to the reduction of moisture by drainage.

The amount of water required in circulation is about 2,000 gallons per minute, and is supplied by a 12-inch centrifugal pump direct connected to a 12x10 vertical engine, running at 250 revolutions per minute. This engine exhausts into a surface condenser, the circulating water of the condenser being used as mentioned above to flush down the coal over the shaking screen.

As originally laid down, a 100 horsepower engine supplied all the power necessary, but now electricity is used for motive power as follows: Crushing house complete, including elevators; one Westinghouse 75-H.P., 60-cycle, 3-phase, 200-volt, 650 revolutions per minute, induction motor; washer house proper, jigs, etc.; 50-H.P. induction motor; Bernard tower; 30-H.P. 220-volt induction motor. All the motors are of the same type.

The following analyses are in each case averages of many determinations, and represent as close an approximation to the actual composition of the products as can possibly be obtained. The raw coals from the three separate colleries have been analysed at regular intervals over a period of several consecutive months, and give the following results:—

Coll.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
A	4.86	29.11	56.73	14.87	2.14
B	5.96	28.38	57.38	14.23	2.09
C	6.51	23.11	54.27	22.61	2.45
Aver.	5.77	26.87	56.12	17.23	2.23

As the weight of coal received from each colliery for each month was known, the following analyses of the mixture received at the wash plant for each month were calculated, and are as follows:—

Month.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
1	5.62	27.71	56.48	15.93	2.17
2	5.61	27.82	56.50	15.98	2.18
3	5.67	27.75	56.54	15.83	2.16
4	5.69	27.40	56.31	16.53	2.19
5	5.68	27.25	56.28	16.72	2.20
Aver.	5.65	27.56	56.43	16.19	2.18

The average analyses of the washed coal resulting from the washing of the above coal, and covering the same period, are as follows:—

Month.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
1	16.25	34.86	60.58	4.52	1.27
2	13.87	35.01	61.00	3.96	1.25
3	11.95	38.20	58.14	3.66	1.45
4	14.01	35.70	58.56	5.80	1.74
5	11.00	35.92	59.36	4.72	1.75
Aver.	13.42	35.94	59.53	4.53	1.50

Thus it is seen that the average reduction for the five months has been from 16.19 per cent. to 4.53 per cent. in ash, or 72 per cent., and in sulphur from 2.18 per cent. to 1.50 per cent., over 30 per cent. reduction. It might be said in regard to the above figures that the greater quantity of ash in the coal in the last two months was due to the increased percentage of "C." coal used. This coal was not run over a picking belt since that colliery was newly opened, and was not as well equipped as the other collieries.

The most prominent feature of the coal treated, a soft bituminous variety, is the high percentage of volatile and combustible matter which is typical of the Cape Breton coal measures. The coal mixture also has a high percentage of sulphur and more ash than is consistent with economy. Most of the impurity is present in the form of slate, there being only a small percentage of bone coal. The following analysis is that of the impurity which sinks in a calcium chloride solution of 1.35 specific gravity.

$Fe S_2$	13.64	
$Si O_2$	28.50	combined
Al_2O_3	17.59	as slate.
Ca O	6.74	
$Mn Co_3$	2.91	
Mg O	0.44	
Chem. Comb. H_2O	15.10	
Carbonaceous matter	14.80	partly bone coal.
	99.72	

About one-half of the sulphur contained exists as iron pyrites ($Fe S_2$), which seems to occur evenly and uniformly distributed through the coal and bone in the form of small nodules, leafy formations between the layers, and as a series of particles in size between 80 and 100 mesh; the remainder of the sulphur is present as organic sulphur. It is impossible to get rid of this latter portion by any specific gravity method of separation, and it is called the fixed sulphur.

The following are the specific gravities of the coal constituents:—

Slate	3.83
Coal	1.27
Splint or bone	1.50
Pyrite	4.80

In order to determine the best possible separation that can be effected with the coal in question by means of a specific gravity method, the following experiment has been made: A calcium chloride solution of slightly higher specific gravity than that of coal, and less than that of the other constituents, was put into a glass jar of about three-quarter-gallon capacity; to this solution was added a weighed quantity of coal of the same size as supplied to the jigs. The contents were stirred briskly and allowed to settle. The sample was now found to be divided into two portions. All particles of a specific gravity less than that of the solution had floated while all the particles heavier than that had gone to the bottom. Between these two layers there remained suspended in solution a small proportion of the particles whose specific gravity was about that of the solution. The floating and sinking portions were separately removed, washed free from the solution, weighed, and analyzed. From the data thus obtained we calculate the purity and yield of the floating portion of the washed coal obtainable. This is the simplest and most effective coal washing operation that can be performed, and the results of this experiment determine absolutely for any coal the maximum purity of the washed coal obtainable from it by any washing process. The calcium chloride solution used was of 1.35 specific gravity, which was found best suited for this coal.

The results of a series of such experiments conducted at the same time as the analysis already given, are as follows:—

Average composition of float on $Ca Cl_2$ solution 1.35 sp. gr.:

Vol. and Com. Mat.	Fix. Carb.	Ash.	Sulphur.
36.67	59.92	3.41	121

From these figures we learn that the coal treated had a fixed ash of 3.41 per cent., and 1.21 per cent. of fixed sulphur. Consequently the plant washed the large tonnage of coal treated in the five months to within one and one-quarter per cent. of the best possible reduction in ash, and to within a third of one per cent. (0.3) of the best possible reduction in sulphur.

The loss in washing for the large amount of coal treated has been 13 per cent. plus 8 per cent., which is the difference in moisture, a total of some 21 per cent., and of this the impurity removed as ash and sulphur is 12 per cent., which leaves an actual coal loss of about 9 per cent. in the process.

The slate resulting from the washing process from the coarse jigs contains about 25 per cent. of good coal, and is therefore lifted by bucket elevator to the top of the jigs and re-washed in No. 4 coarse jig with the following results:—

	Original slate.	Washed coal from slate.	Slate re-washed contans about 13% impure coal.
Vol. and Com. Mat.	21.80	30.59	19.10
Fix. Carb.	37.10	51.61	24.40
Ash	41.10	17.18	50.50
Sulphur	4.06	2.79	9.07

This re-washed product is used about the plant under such boilers as are worked below their rated capacity.

A point of interest about the washer is the ingenious method of disposing of the slate, which was introduced last spring by Mr. John Preston, the engineer who had supervision of this department. Hitherto the slate had been elevated to a bin in the storage tower, from whence, at proper intervals, it was removed on cars to a convenient dumping place. The present scheme is quite simple, and consists in flushing the slate from the jigs directly to the sea.

The following description of the equipment will explain the method in detail: An 8-inch pipe has been laid from the shore to the central condensing plant at the colliery where the washer is situated, and through it a 7-inch Gwynne centrifugal pump supplies salt water for condensing purposes. This pump has a rated capacity of 1,200 imperial gallons per minute at 900 revolutions per minute, and is directly connected to a 50 horsepower, 3-phase, 60-cycle, 220-volt induction motor located at the seashore. The condenser is a 12 and 17x19x15 Worthington jet condenser, arranged to take steam from a Walker double compound compressor, a tandem compound fan engine, a tandem compound haulage engine, and a simple cylinder haulage engine; the four engines totalling up about 1,500 horsepower. The discharge pipe of the 7-inch centrifugal pump, which has a lift of 50 feet, is directly connected to the suction pipe of the air pump of the condenser. The air pump discharge delivers the salt water, after condensing the steam from the engines, to a 6-inch cast iron pipe, which passes through the wash plant, and is used for conveying the slate from the wash plant to the cliff, a distance of about 700 feet.

A valve controlling the amount of water supplied to this pipe is placed between the air pump discharge and the square hopper through which the slate enters the

pipe, with an overflow ahead of it which carries away the difference between the amount of water delivered and the amount required. The supply valve is kept sufficiently open to allow the water to half fill the hopper. The pipe is laid on a downward grade, varying from one to four per cent., towards the cliff. At the cliff, which it overhangs, there is a vertical leg about 26 feet long, the effect of the latter is to give an hydraulic gradient to the entire line sufficient to cause a flow of about 600 or 700 gallons per minute, when the pipe runs full bore; the resultant velocity causes all slaty material to be easily carried through the pipe.

In order to keep foreign material, such as bolts and spikes, from getting into the pipe and plugging it up, it has been found necessary to fit the hopper with a special grating, which consists of a cast iron plate, about six inches thick, perforated with 2½-inch diamond-shaped holes, the holes being V-shaped or zigzag in vertical section; this construction allows any round or square material up to about 1½ inches in diameter to pass through it, but will not allow any material having a length of over 2½ inches to pass. Further precautions are taken to cope with clogging in the line by having special oblong openings cast in the pipe every few hundred feet apart. These openings have covers screwed on, which can be removed at will. Should the pipe become clogged, lengths of small pipe, such as are commonly kept in stock, are coupled together and inserted into the opening immediately below the clog, and forced against the obstruction, the water pressure being kept in the meantime on the remainder of the pipe. Once started, the rush of water quickly clears the pipe.

Since the amount of water used for flushing purposes is already required by the colliery for condensing, the colliery and wash plant divide the pumping charges equally, and the cost of disposing of the slate by this method is very low.

The figures of a typical analysis of the coke from the washed coal may prove interesting. Such an analysis would be as follows:—

Moist.	Vol. and Com. Mat.	Fix. Carb.	Ash.	Sulphur.
12.5	2.25	90.50	7.25	1.22

Thus it will be seen that this plant renders possible the manufacture of a coke which is eminently suitable for use in the iron blast furnace from a coal which unwashed would be unsuitable, and in addition utilizes for this purpose the less desirable, from the fuel point of view, portion of the coal, that is, the screenings.

The writer wishes to acknowledge his indebtedness to the management of the Nova Scotia Steel and Coal Company for permission to use the information given and for access to the records of their chemist. The author is, however, responsible for the preparation of the average analyses and for the conclusions drawn.

INAUGURAL ADDRESS.

By the President of the C. M. and M. Society of South Africa.

(*Continued from last issue.*)

Apprenticeship to Mining.—For those who would take up the work of actual underground mining as a means of livelihood, the system of apprenticeship, as started by the Association of Mine Managers, would seem to be an excellent scheme, and it was with great regret that I learnt from some remarks made by Mr. Laen Carter at one of our recent meetings, that "so far it had not been a success, and that at the present time there are very few apprentices underground." This is not as it should be. Means must be found to induce young men to submit themselves to a regular and thorough apprenticeship below ground, as is done by mechanics above ground, so that when a youth having duly served his term, applies for work as a full-fledged miner, the employer will have a guarantee that the applicant does possess a knowledge of the work he wishes to undertake, and to such as take a serious view of mining work and wish to learn thoroughly what is most necessarily, namely, the theory as well as the practice of the work, I would commend the evening classes in mining, which are held at the Transvaal University College, where the miner is taught how to work intelligently, and thus benefit himself, the mine, and also his fellow workmen. Under the new scheme of the Mine Managers' Association an inducement is held out to apprentices to attend these classes, which I find, on enquiry, have a large membership, and which are attended by men coming from far distant parts of the Rand, showing at the same time the attraction of the classes and the keenness of the students. The youth of this country has to learn to appreciate the fact that if it wishes to take a proper part in the development of the resources of this land it must take measures to submit to a course of study, not alone in one particular subject, but in a general knowledge of science, and to the youth I would say, the means are at hand, make use of them.

I look to the Metallurgical Trials' Committee, which has lately been formed under the aegis of the various mining houses, for much assistance to the mining and metallurgical world. Co-operation of this nature will permit of far fuller and more practical investigation of the merits of any invention or improvement than would otherwise be the case, and I am sure that all those who have thought out improvements, which they are individually unable to have tested or experimented upon, will note the constitution of this Committee with pleasure, and will not be afraid to lay their ideas before the representatives, as I am confident that all trials made will be carried out in the most thorough manner.

Agriculture and Agricultural Chemistry.—There is little question that, apart from the mining industry, which is, undoubtedly, at the present time the staple industry of the country, there are enormous possibilities in the direction of agriculture, and owing to the many varied natures and constituents of the soils to be dealt with, the problems of properly dressing and manuring the land will provide much work for the chemist, without whose aid I fear those who engage in the farming industry will be but floundering in the dark. Those who read that most interesting production, the Transvaal Agricultural Journal (which I may state is free to every citizen of the Transvaal for the asking), will appreciate the great amount of work which has been done in every branch of agriculture by those employed on the Government farms, and I trust that our Government will always realize the great value of the various researches which have been made in the past, and the value of which will perhaps be more apparent in the future, to those engaged in agricultural pursuits. We know that there is a prevalence of a great number of various description of pests, the occurrence of which dishearten the farmer and often indeed stultify his efforts, but I am sure that by perseverance and careful study the difficulties and dan-

gers from this cause will eventually disappear, and in the attainment of this end the chemist will figure largely. I again venture to hope that our Government will recognize the great work which has already been done, and which still has to be done, and will give every encouragement to foster scientific investigations, and the work of the chemist in its application to the benefit of what must become one of the great industries of this vast country with its many and varied conditions of climate and soils.

South Africa should, undoubtedly, be in a position to become a country absolutely self-supporting in every respect. The question of irrigation and the proper conservation of water is one which may rightly and safely be left in the hands of our brother scientists, the engineers.

We have as a lesson in possibilities our marvellous gold industry, and in this respect I cannot do better than refer to the words of that eminent financier, Herr Dernburg, who recently visited us. In the course of a most instructive and eloquent speech he stated that there was a time when the standard of currency was greatly exercising the minds of financial men in the great centres of the world, the question being whether the standard should be gold or silver. At that time arose the Goldsmiths of the Transvaal, the output from which settled the question once and for all; it was to be gold. I doubt if this important fact had ever before been made patent to the world (outside the world of financial men), and I take it to be a happy augury that if South Africa has been able to settle this important question she will be able to settle many others of as great importance to the welfare of human-kind.

Our Society continues to be on terms of the greatest amity with the kindred societies; this is much evidenced by the fact that some of our members have been invited by the Transvaal Institute of Mechanical Engineers to assist upon a committee, which that institution has formed for the purpose of establishing South African standards for strengths of materials, etc.

Our Society is now widely represented by members in all parts of the world, but there is still much further scope for its usefulness, and I trust that those who have been and will be appointed (under the new scheme, which you have approved of and which strikes me as such an excellent one) "as Corresponding Members of Council" will do their utmost to further our interests by bringing in new members, and by obtaining for our information and instruction, papers upon the many and varied subjects which come under the scope of our work, and also help us by contributing to our discussions. While on the matter of discussions, I cannot too strongly urge upon members the value of the fullest possible discussion upon a paper, as by this means we learn the views of individuals, and obtain the results of the experience of many hard and practical workers who may not feel able to write original papers, but whose attention and interest is awakened by statements made in papers written by others, which statements they may be able to confirm or otherwise from their own experiences, and thus the discussion becomes as valuable as the original paper. I would also urge our members to come forward with descriptions and records of processes and methods which they may have tried and not found to be successes. The information contained in a record of trials which have proved failures is of the greatest value to the metallurgical world.

The reduction in working costs, improvements in plants, and higher efficiency in the mining and metallurgical departments, as well as better extraction, have brought large bodies of ore, which were in former times classed as "unpayable," either within, or very nearly within the "payable" class, and it must be the aim of all the members of our Society, both the mining and the metallurgical members, to take advantage of all existing improvements and to endeavor to devise new ones in order to assist in bringing down the general costs of production to such a point that aided, we may hope, by still better extraction of the gold, it shall be possible to see a profit where but loss existed before. In this endeavor we must work hand in hand with our good friends the kindred societies of engineers, whose aims run on lines parallel to our own. Thus can we do our portion towards making it commercially possible to open up new lines and to reopen many old ones, to the end that the industry may be able to sustain a larger white population, and that by such means the burden of those who are now suffering so severely from want of employment may be lightened, and prosperity may again reign in this country.

COAL BRIQUETTING IN 1907.

By Edward W. Parker.

From Advance Chapter Mineral Resources of the United States.

That considerable progress was made in the development of a briquetting industry in the United States in 1907 is shown by the reports of operations made to the Geological Survey for that year. There were eleven plants in actual operation during 1907, although one of these, that of the Pittsburg Coal Mining Company, at Pittsburg Landing, Cal., was burned in July and had not been rebuilt up to the close of the year. The total production of briquets, as reported to the Survey, amounted to 66,524 short tons, having a value at the plants of $258,426. When compared with the development of this industry in Germany (in which country the production of briquets in 1906 amounted to about 16,000,000 short tons), the production in the United States appears insignificant, but it is of importance as indicating that a beginning has been made, and with the success of the established plants demonstrated and the gradual education of consumers in the advantages of briquets for efficiency, ease of handling, and cleanliness, rapid progress should be made in this industry during the next few years.

As constant dropping of water wears away the stone, so the constant agitation of this subject has begun to show its effect, and the rock of opposition, or at least of inaction, is being worn away. There can be little doubt that the interest aroused through calling attention to the waste of that part of the country's natural resources, represented by the nonuse of the slack and culm pro-

duced in our coal-mining operations, and the aggressive policy of President Roosevelt in seeking to throw light upon it and to correct the abuses into which we have largely unconsciously fallen, are to a great extent responsible for the present prospect of a development of coal briquetting, as an important industry in the United States. It may not be long before the governments of the States, under whose jurisdiction the matter comes, will enact legislation against the accumulation of slack and culm heaps or their useless destruction by burning, and prohibit this waste, as they have in some cases interdicted the waste of natural gas.

Legislation which would prohibit "shooting from the solid" at mines, when the slack coal is not a marketable product, and which would provide penalties for excessive use of powder, would have, as one result, a larger percentage of lump coal, and thus, in part at least, enable operators to assume the additional expense involved in the briquetting of such slack coal as is unavoidably produced.

There were eleven coal briquetting plants in the United States, each manufacturing briquets, during 1907. The location of these plants and the character of the fuel and binder used in the operations are as follows:

Arizona Copper Company, Clifton, Ariz.—This company uses bituminous coal, mined in New Mexico, with an asphaltic pitch made from California crude petroleum. The briquets weigh aproximately 4 pounds each and are used under the boilers of the company's plant. The briquetting machine is of English design and is described in the United States Geological Survey Bulletin 316, published in 1907. The capacity of the machine is 24 tons in a day of ten hours.

Western Fuel Company, Oakland, Cal.—This plant, which is also described in Bulletin 316, operates on bituminous coal slack or screenigs with asphaltic pitch, with proportions of 90 per cent. of coal and 10 per cent. of binder. The capacity of the machine is 60 tons in a day of ten hours. The operations of the company were begun in June, 1905. The briquets are cubical in shape, with rounded edges, and weigh approximately 10 ounces each. They are used principally for domestic purposes.

Pittsburg Coal Mining Company, Pittsburg Landing, Cal.—This plant was put into operation during the first six months of 1907, but was burned in July. It was operated upon screenings from the coal yards of San Francisco, using asphaltic pitch as a binder in the proportions of 92 per cent. of coal and 8 per cent. of pitch. The briquets are of semicylindrical pattern, weighing about 8 ounces each and are used principally for domestic purposes.

Indianapolis, Briquetting Company, Indianapolis, Ind.—This company began installing briquetting machinery in 1906 and commenced operations in November, 1907, using 92 per cent. bituminous coal slack and 8 per cent. of coal-tar pitch. The briquets are of cylindrical shape, weighing 5 ounces when intended for domestic purposes. Larger sized briquets can be made, if desired, the capacity of the machine depending upon the size of the briquets.

Semet-Solvay Company, Detroit, Mich.—The Briquetting plant of the Semet-Solvay Company, located at Delray, Mich., is operated in connection with the plant of the Semet-Solvay by-product coke ovens at that place and is intended primarily to make available for use the coke "breeze" produced at the ovens. As originally designed (early in 1905) this plant contained a Johnson (English) briquetting press, but the product, on account of the large size of the briquets, was not found adapted to the market and a Mashek type of press was substituted. The new machine was started in August, 1907. Another machine, producing the eggette or ovoid-shaped briquet, has been purchased but has not been delivered. When the new machine is installed the plant will have a capacity of nearly 20 tons an hour. The present practice consists in using a mixture of 50 to 75 per cent. of bituminous coal slack and 50 to 25 per cent. of coke breeze. From 91 to 95 per cent. of this mixture is used with 9 to 5 per cent. of coal tar pitch. The briquets weigh about 2 ounces each.

Western Coalette Fuel Company, Kansas City, Mo.—This company is operating a Renfrow machine, the type of which, described in Bulletin 316, formed a part of the equipment of the Geological Survey coal-testing plant at St. Louis, Mo., subsequent to the exposition period and later at the Jamestown Exposition. The machine was installed in Kansis City in April, 1907, and is operating upon semi-anthracite slack from Arkansas and Oklahoma and bituminous coal slack from Kansas and Missouri, using coal-tar pitch as a binder in proportions of 94 per cent. of coal and 6 per cent. of binder. The briquets are cylindrical in shape with convex ends, weighing approximately 14 ounces. They are intended for household, locomotive, and stationary boiler use. The capacity of the machine, of which there was only one installed at the close of 1907, is 8 tons per hour. The operations during the year were largely of an experimental character and considerable construction work was caried on at the same time.

D. Grieme Coal Company, foot of West Forty-seventh Street, New York, N.Y.—This plant, among those described in Bulletin 316, was put into operation in October, 1907. The press is of Mashek design and makes a small, rectangular, convex briquet which is intended entirely for domestic purposes. They weigh aproximately 2 ounces each. The coal used is anthracite No. 3 buckwheat and culm with coal-tar pitch as a binder, the proportions being 93 to 94 per cent. of coal and 6 to 7 per cent. of binder. The capacity of the machine is rated at 13 tons of briquets per hour.

The National Fuel Briquette Machinery Company, foot of Court Street, Brooklyn, N.Y.—This plant is also described in Bulletin 316, and consists of a Belgian type press manufacturing small eggettes which weigh less than 2 ounces each. It is operated on anthracite culm and coal-tar pitch with proportions of 95 per cent. of coal to 5 per cent. of pitch. The eggettes are intended primarily for household use, and the principal market is in the domestic trade of Brooklyn. They are also used to some extent for stationary boilers. The capacity of the machine is rated at 6 tons per hour.

The Scranton Anthracite Briquette Company, Dickson City, Pa.—This plant was the largest producer of briquets in the United States during 1907, although it was operated only seven months during the year. The plant is located adjacent to one of the Delaware, Lackawanna and Western mines, near Dickson City, and the briquets are used on the locomotives of that railroad. Anthracite culm is used exclusively with a patented binder of which coal-tar pitch is a principal ingredient. The company prefers not to publish the proportions of coal and pitch used. The briquets are of eggette pattern, weighing about 8 ounces each. During the year the company was engaged in enlarging its plant, and for this reason operations were carried on during only seven months of the year. When the extension work is com-

pleted the company expects to have a capacity of 10,000 or 12,000 tons of briquets per month.

The Briquette Coal Company, Staten Island, N.Y.—This plant, which was completed in July, 1906, and which was briefly described in Bulletin 316, consists of two presses, one of German type and one of Belgian type, the briquets made in the former weighing approximately 1 pound each and those in the Belgian about 4 ounces each. The machines have a capacity of respectively 4½ to 7½ tons per hour. The plant is operated on a mixture of anthracite culm and bituminous slack coal and also on anthracite alone with a binder, of which coal-tar pitch is the basis. The company does not care to give details as to binder or the percentages used.

The United Gas Improvement Company, Point Breeze, Philadelphia, Pa.—As stated in the report on the Coal Briquetting Industry in 1906, published in Bulletin 316, this plant is operated primarily for the purpose of utilizing the breeze produced at the gas works of the company. It is found advantageous to mix the coke breeze with anthracite culm and bituminous slack in addition to the binding material. The average mixture is 42 per cent. anthracite culm, 13 per cent. bituminous slack, 35 per cent. coke breeze, and 10 per cent. water-gas pitch. The briquets weigh approximately 5 ounces each, are of eggette pattern, and are charged into retorts and used in the manufacture of water gas. There are two machines in the plant, both of Belgian type, which have a capacity of 50 tons per day.

In addition to the preceding list of plants, all of which were in operation in 1907, the following companies have been organized for the purpose of establishing coal-briquetting plants. This list does not include any of the names published in Bulletin 316 which have passed out of existence or from which no replies were received from inquiries sent asking for information regarding the operations of the plants during 1907:

The Standard Fuel Company, Birmingham, Ala.—A new company, incorporated in 1907; it did not produce any commercial briquets during the year.

The United States Briquetting Company, San Francisco, Cal.—This company was organized for the purpose of exploiting a process for briquetting peat with California petroleum. All of the work so far has been of an experimental character.

North American Coal Briquetting Company, 81 New Street, New York, N.Y.—This company was organized for exploiting the Forst briquetting process, the main feature of which consists in the material to be used as binder. It consists principally of coal-tar pitch, but the other ingredients of the binding material are kept secret and the process is a patented one. The company has not yet begun operation on a commercial scale.

Zwoyer Fuel Company, 60 Wall Street, New York, N.Y.—The plant of this company, which is described in Bulletin 316, was removed from Brooklyn, N.Y., to Perth Amboy, N.J., during 1907, and was not operated during the year.

American Briquetting and Manufacturing Company, Williston, N. Dak.—This company was organized for the purpose of briquetting North Dakota lignite, using 94 per cent. of lignite and 6 per cent. of binder composed of flax-fiber sirup and rosin. The briquets are to be made in large sizes, weighing 2 pounds 8 ounces each. It is estimated that the machine would have a capacity of 9 tons per hour. It is anticipated that the plant will be in operation during 1908, manufacturing briquets intended for household purposes and for stationary boilers.

Washington Coal Briquetting Company, Seattle, Wash.—This company was incorporated in 1907 for the briquetting of slack coals from the coal mines of the State. The plant had not been completed at the close of 1907.

The Coal-Briquette Machine Company, Oshkosh, Wis.—This company organized in 1907 and expected to be in operation during 1908. It is manufacturing some briquets out of anthracite and bituminous coal and lignite in an experimental way. The briquets are cylindrical in shape and weigh, approximately, 12 ounces each. The capacity of the machine is rated at 48 tons a day.

American Lignite Briquette Company, Rockdale, Tex.—This company, of which Mr. J. J. Olsen, of San Antonio, is president, was organized in 1907 for the purpose of briquetting lignite mined at Rockdale. The company expected to be in operation during the summer of 1908.

United States Coal Manufacturing Company, 1339 Arch Street, Philadelphia, Pa.—This company has manufactured some briquets in an experimental manner, but at the close of 1907 had not produced any on a commercial scale. The briquets are of triangular shape, of small size, and intended for domestic use. The character of the binder and the proportion of binder and coal used are kept secret by the company. High calorific value, easy ignition, complete combustion, and absence of clinkering are merits claimed for these briquets.

R. B. Metcalf, Portsmouth, R.I.—Mr. Metcalf, who has done considerable experimental work in the briquetting of Rhode Island anthracite, had not begun the manufacturing of briquets on a commercial scale at the close of 1907, although he expected to have a plant in operation before the close of 1908.

When a few years ago, the alloy of aluminum with 6 per cent. of copper for use for various naval purposes did not give the complete satisfaction that was expected of it, the aluminum then available had not the degree of purity which now obtains. Aluminum manufacturers then set to work to improve their methods of manufacture; they now produce aluminum of a high degree of purity, and they are quite as eager in recommending the use of this pure aluminum in alloys as its ing of a French aluminum manufacturer to the effect use alone for different engineering purposes. The say- that "the future of aluminum lies upon the water." is more true now than it ever has been. Seeing also the very great efforts which are being made at the present time in the construction of dirigible balloons and aeroplanes, its future is likely to be further extended still, while in the numerous branches of the electric industry the use of aluminum is steadily developing day by day."

The marble output of the United States in 1907 was valued at $7,837,685. Vermont marble is used for outside building and for monumental work, also for interior decorations, for electric work, mosaic work, etc., and is sold principally as dressed stone. Vermont produced about 1,450,000 cubit feet, 58.65 per cent. of the entire output.

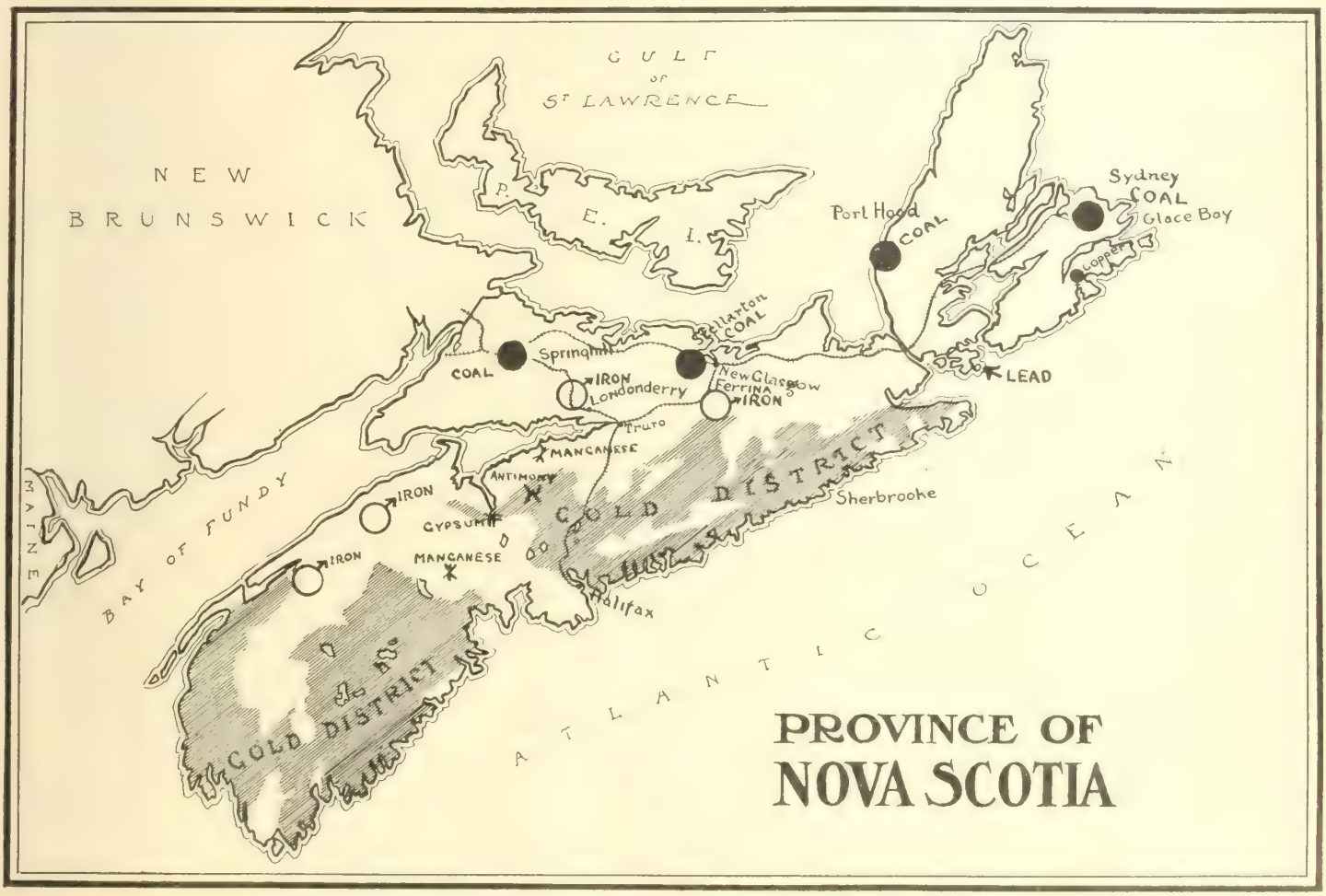
GOLD MINING AT WAVERLEY, N.S., FIFTY-TWO YEARS AGO.

The late Sir J. W. Dawson visited the Waverley gold mines in 1866, six or seven years after the first discovery of the metal in Nova Scotia. Sir William, then plain Mr. Dawson, incorporated a note this visit in his book, "Acadian Geology."

The Waverley veins were at that time the most extensively worked in Nova Scotia. The ore was extracted in large open cuts along the strike of the vein, and was hoisted by horse "gins." The deepest pit was 225 feet. Dawson noted in this pit that the vein consisted of compact grayish-white quartz, varying in thickness from four feet to six inches, but having an ordinary width of about two feet. The footwall, he states, consists of coarse gray slate, with small cross veins of quartz, the hanging wall of hard gray quartzite presenting a waved and crumpled surface. "The quartz," he remarks, "has a laminated or banded appearance, and the gold seems to be most abundant near the walls; though visible gold is rare in this vein at present, the greater part being in a minutely disseminated and invisible state. The superintendent of one of the mines informed me that the thicker portions of the vein afforded scarcely more gold than the thinner portions, and that the gold is most abundant near the hanging wall." This particular vein was known then, as it is now, by the name of "Tudor."

Mr. Dawson expresses admiration for the equipment of the "German" mine at Waverly. The quartz from this vein, he tells us, "is crushed in an admirable stamping mill, worked by steam, and at present having sixteen stamps, though capable of being increased to twice that number." The completeness of the apparatus "for the *subsequent* amalgamation and distillation necessary to obtain the gold," is commented upon. The problem of recovering the gold from the "metallic sulphurets" was even at that early date a subject of practical interest. Dawson does not, much to our regret, go into details on this point. Battery amalgation was not in vogue. Only the gold caught on the plates was recovered.

The yield in those days was heavy. Waverly ore averaged more than one ounce of gold to the ton, despite crude and wasteful methods. Five mills, four worked by steam, and one by water power, were in operation. In 1865 the Waverly district yielded 13,102 ounces. The



WAVERLEY LIES ABOUT TWELVE MILES FROM HALIFAX ON THE I. C. RY.

rate of return per man employed was $895 per annum.

In view of the later history of gold mining in Nova Scotia, Dawson's recommendations as to mining methods and government assistance have something of a prophetic air. Summing up the situation (1866) he points out that the veins then opened were not worked up to their highest point of profit. Even in the larger mines, like those of Waverly, no vertical shafts had been sunk on the veins.

"The desire to make the work [immediately] remunerative as it proceeds has induced all the companies to sink on the slope of the veins,and to conduct the works on the cheapest possible plan." Dawson then expresses a strong conviction that, considering the regularity and extent of the veins, were vertical shafts sunk to a great depth and regular mining in the Cornish plan pursued, the initial outlay would be more than repaid by increased production. Some of the veins then worked had improved with depth; others showed impoverishment. But Dawson affirmed that there was no sound reason to doubt that the principal veins opened continued profitable to great depths. In his opinion it would have repaid the Provincial Government to grant special privileges to such companies as were willing to expend sufficient capital to open mines on a large scale.

Some conception of the interest taken in gold mining five years after the first rush occurred is obtainable from the fact that in 1865 there were 38 stamp-mills in commission. Twenty-seven of these were run by steam, 11 by water power, 30,963 tons of ore crushed yielded 24,162 ounces of gold. The average yield was 15 dwt. 14 grains per ton. The maximum yield, evidently from a small parcel of ore, was reported from Wine Harbour. This was 87 ounces per ton. The average yield per man employed was $669.41.

UNIT MINING AREAS OF DIFFERENT COUNTRIES.

There is great divergence in the unit mining areas of different countries. For information of this sort, Hatch and Valentine's "Mining Tables" is a ready source of reference.

Some of the following statements are not revised to date, but in the main they are correct. The mining area of British Columbia is a rectangular claim not exceeding 1,500 feet in length or width, measured horizontally, with no extralateral right. The vertical planes in which the boundaries lie, projected downward define the underground rights.

The gold and silver mining area of Nova Scotia is a rectangle measuring 250 feet by 150 feet, laid off with the shorter sides running east and west. 100 is the maximum that can be taken up by one person. For the mining of other minerals an area of five square miles, not exceeding 2 1-2 miles in length, may be granted.

400 acres is the amount of mining territory that one person may acquire in Quebec, although by special Order-in-Council 1,000 acres may be taken.

For gold and silver the New Brunswick area is practically the same as in Nova Scotia.

The unit area for vein mining in the United States is the claim of 1,500 feet along the strike of the vein by 600 feet in width. By virtue of the "law of the apex" extra-lateral right allows the vein to be followed beyond the vertical plane in which the surface boundaries lie.

In Mexico the unit area for the mining of all metals, precious stones, rock-salt, and sulphur, is the pertenencia, which is a solid block of unlimited depth, defined above ground by that part of the surface which in horizontal projection gives a square, each side of which measures 100 metres; and bounded underground by the four vertical planes corresponding to the sides of the said square.

The Transvaal claim, for vein and reef mining, has an area of 60,000 square Cape feet. (One Cape foot equals 1.033 British). Where practicable the claim is a rectangle in form, measuring 150 Cape feet along the strike by 400 Cape feet in a direction at right angles to the strike.

SETTLING SLIMES IN CYANIDE TREATMENT.

"The author describes a process which has given remarkable results, both in the completeness of the separation effected and in the small proportion of liquid carried off by the solid matter, which is removed as it reaches the bottom of the tank. This is of inverted pyramidal shape, and connects at the bottom through an 8-in. square aperture with a closed box in which a 10-in. belt is made to travel slowly. The method may be applied in practice in either of two ways. First, as in intermittent process in which the belt discharge of solids would be delivered into a second similar tank where a weak solution or wash water could be sprayed on to the belt to loosen and disintegrate the slime; or a mixer may effect this purpose. After removal of the required proportion of solids the solution would be withdrawn to the original level and a second charge introduced. Secondly, the introduction of a suction filter near to the surface of the liquid in the separator, permits of a continuous process being carried on. The percentage of moisture in the discharge is inversely as the proportion of solids in the separator charge, and the first portions of a discharge from any given separator charge are always better than the succeeding portions, hence the density of the separator charge is maintained as its initial figure, the moisture in the discharge would be kept at a minimum and the rate of discharge increased. By an automatic periodical cutting off of the suction and application of small back pressure the filter screen is kept clear from caked slime and clear liquid is continually drawn from a pulp of sp. gr. 1.4. The belt and suction must be so correlated that the solids discharged are proportionate to the liquid sucked out, and the discharge from a pulp of the density stated will uniformly contain about only 22.5 per cent. of moisture. If there be two suction pipes with screens they are kept clear by back pressure being applied alternately to each. The continued use of screen suction would not be possible unless the solids were being extracted by the conveyor belt. The procedure in the wash settlers is practically the same. The solids are washed off the belt by precipitated solution and water, and the suctions withdraw an equal amount of liquid, which is passed through the extractor boxes and returned from the sump. In other processes completeness of washing is dependent on time and capacity of plant, as each instalment of slime is taken separately and washed solution passed through it as long as economically possible, when it must be removed, whether well washed or not, to make room for the next

instalment; but in this method continuity is unimpeded and slimes may be washed out with any reasonable quantity of weak solution without affecting the time of treatment—the only factor affected being the capacity of the extractor boxes.

The advantages of this method are: (1) Absence of pumps, carrying machinery and complicated appliances; (2) the separation of sands from slime is not called for, and thus disadvantages attendant on dealing with such classes of material as depend on close classification are obviated; (3) it is possible to wash to the best advantage and thus reduce the loss by residual moisture; (4) the degree of fineness or uniformity is immaterial; (5) the initial cost is very low, and niceties of adjustment are not requisite; (6) the only limit to the thickness of a charge is the point at which it will not run, and best results are obtained from charges with high percentages of solids; (7) the process may be continuous. The paper is accompanied by diagrams and tables showing the arrangement and the results of working."—Electrochemical and Metallurgical Journal.

ELECTROLYTIC SEPARATION OF NICKEL AND COPPER.

Nickel can be accurately determined by electrolysis of the nitrate, provided (1) no nitrite be present, (2) a sufficient excess of ammonia be added, and (3) a straight wire of passive iron be used as anode. Iron is necessary since platinum anodes are more or less irregularly attacked, and the dissolved platinum is deposited with the nickel. The metals (0.4 to 0.5 gram in all), or compounds containing them, are dissolved in nitric acid, with an excess of 5 c.c. of strong acid. Nitrous acid is expelled by boiling. The volume is made up to 100 c.c., and the copper precipitated by a current of 1 ampere at ordinary temperature. Towards the end of the operation the solution is warmed up to 50 degrees or 60 degrees C. To the bath is now added 80 c.c. of ammonia (s.g. 0.91), the iron wire anode, cleaned in hydrochloric acir and rendered passive in strong nitric, is substituted for the platinum one, the coppered cathode replaced, and the nickel deposited on it by a current of 5 amperes. The current heats the solution to 70 degrees C. When the liquid is decolorized and gas evolution occurs at the cathode, the latter is withdrawn without stoppage of current, and washed, dried, and weighed. After retesting, the deposition of nickel is complete in 55 minutes. The ammonium sulphide test is useless in solutions containing so much free ammonia. Hence the need of retesting.

NEW USE FOR PLASTER OF PARIS.

"Not only is plaster of Paris an excellent flux for melting such materials as washings, grindings, or chips, but it has also the property of removing iron, a fact not generally appreciated. Plaster of Paris when melted fuses to a clear liquid, which has the property of dissolving oxides. Being a heated flux it does not attack the crucible. To use plaster of Paris for melting washings, grindings, or other scrap which contains iron, about 5 lb. are mixed with 100 lb. of the scrap and the whole is melted down. The plaster melts and clears the scrap of the iron. When the whole is thoroughly melted and the metal well stirred the plaster need not be skimmed off. The whole is poured into an ingot mould. When cold, the plaster is easily removed by a blow from a hammer. Frequently it comes away of its own accord. Small quantities of iron may in this way be removed from scrap metals, a good melt being at the same time obtained. Not only is plaster of Paris an excellent flux for melting such materials as washings or grindings, but it has the great advantage of not attacking the crucible. This is not possessed by any other flux."—Indian Engineering.

MINERAL LAWS OF NEWFOUNDLAND.

In the ancient colony it is lawful for any person to search and prospect for minerals, and to prove the existence, value, and extent of minerals therein or thereunder, without first obtaining a license. This liberty, however, is qualified by the provision that such search and prospecting shall be bona fide with a view to obtaining a mining location and lease thereof under the provisions of the Crown Lands Act. No person so searching or prospecting is permitted to remove from the land any greater quantity of ore, mineral, or metal than shall be necessary to be used as samples. The above does not apply to land appropriated or reserved by the Crown.

CANADIAN PLACE NAMES.

Confusion has resulted from the careless naming of localities in Canada. This is felt as much by the mining fraternity as by any other class. To illustrate some of the needless sources of confusion one has but to look through the pages of the Geological Survey Index. Everywhere, in every province, there is duplication of names of towns,, villages, districts, rivers, etc. There are 22 streams known by the name of "Little River." There are five "Eel" rivers and 20 "Black" rivers. And so on. Names of this sort are entirely lacking in charm and meaning.

MINERALS AND WATER SOLUTIONS.

Metals are precipitated from solutions of their salts by natural silicates. Almost equivalent quantities of the bases of the silicates are dissolved at the same time. In these reactions the most common replacing bases are sodium, potassium, magnesium, and calcium. The metals are precipitated as hydroxides or basic salts.

The principal changes in matters pertaining to ore dressing during 1907 were in the direction of modifications of existing processes. Steam stamps are used extensively only in the Lake Superior copper districts. The Harz jig is still acceptable. The Wilfley, Deister, and other such concentrating tables are most used for fine concentration. Suspended Frue vanners have been tried successfully. There is a marked tendency to introduce flotation processes of various types for the concentration of mixed sulphides. Magnetic concentration has advanced rapidly, bot hin efficiency and in scope of application. In Norway and Sweden the concentration of lean magnetites, along with briquetting of the products, has been most successfully carried on. In America the field for this work is opening up rapidly.

BOOK REVIEWS.

Who's Who in Mining and Metallurgy, containing the Records of Mining Engineers and Metallurgists at Home and Abroad, 1908. Founded by George Safford. The Mining Jounral, London.

We have often suffered inconvenience from the fact that until now there has been no published list of British mining engineers and metallurgists. Even in Canada, although in point of numbers our professional mining men are relatively few, it is not always easy to keep track of every member of the fraternity. Both here and in the United States dependence msut be placed upon the membership lists of technical societies and upon personal items in the periodicals. But, it may be because of the superior modesty of our English brethren, as we have long ago given up the attempt to place any but the most prominent engineers of the motherland.

We extend a hearty welcome to "Who's Who." In its pages we may ascertain the present address, the professional qualifications and other pertinent facts concerning Great Britain's mining men.

Naturally there are omissions. These are due, however,fi not to oversight on the part of the editor, but to the indifference of those whose names are not included.

Canadian mining engineers, investors and others will find "Who's Who" a most serviceable volume.

The Mineral Industry: Its Statistics, Technology and Trade during 1907. Edited by Walter Renton Ingalls. Volume XVI. Supplementing volumes I. to XV. 1100pages. Price, $10. Hill Publishing Co., 505 Pearl St., New York, 1908.

The annual volume of "The Mineral Industry" is too well known to need introduction to our readers. This sixteenth annual edition is in many respects an improvement upon its predecessors.

While the mineral industries of the United States are given first place, those of the rest of the world are not neglected. The correlation of data gathered from all over the globe adds largely to the interest of the volume.

Under title of the minerals in question the volume is devided into chapters each of which is a complete treaties on one branch of the industry. Geological technological and commercial conditions are outlined. Export and import trade is not overlooked.

Statistical tables accmpany each chapter, and figures on the world's mineral output are collected in the last section.

The chapters of most general interest and those describing the advances made during the past year in the study of ore deposits in sampling and assaying and in ore dressing and coal washing.

The list of contributors includes the names of the most brilliant technical writers in America.

In conclusion we must call attention, not for the first time, to the misinformation that vitiates Mr. J. P. Hutchins' description of dredging in the Yukon. It is out of place to reiterate here our criticisms of Mr. Hutchins' attitude. It is also impossible that Mr. Hutchins can have obtained his information at first hand.

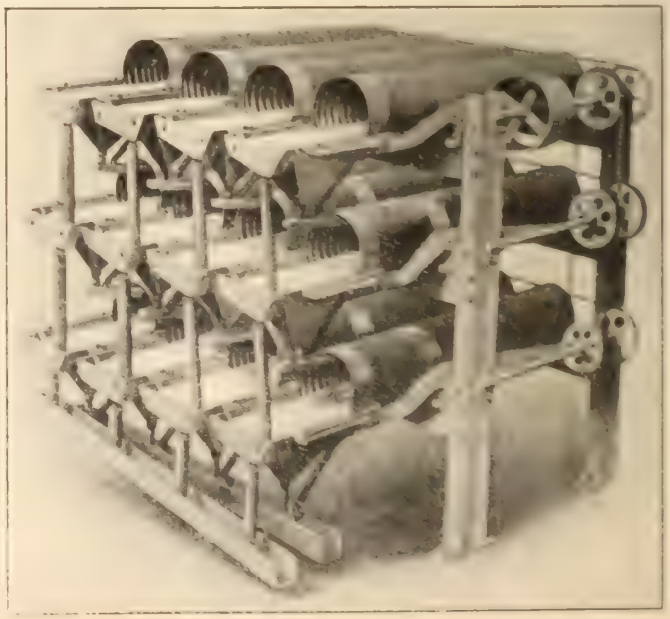
For an accurate account of dredging in the Yukon we must refer the reader to two articles by Mr. T. A. Rickard appearing in the Mining and Scientific Press of August 29, and September 12. These articles were written after personal inspection of the dredging territory of the Yukon.

EXCHANGES.

The Engineering Magazine, September, 1908.

Mr. A. Selwyn-Brown's short review of modern development on the metallurgy of lead and zinc is most timely. After disposing briefly of the Huntington and Herberlein, the Carmichael-Bradford, and the Savelsberg processes of wasting and agglomeration, Mr. Selwyn-Brown touches on briquetting concentrates and fine sulphides, sintering, and so on.

But the most important section of the paper is that descriptive of the Macquisten process of flotation, the recent invention of a Glasgow investigator. The Macquisten process differs from the Potter, Delprat, De Bavay, and Elmore processes in employing no chemicals. The sulphide particles are separated from the gangue by utilizing the surface tension of water by means of a simple mechanical device. The operation is based upon the fact that sulphide minerals are positively affected by the surface tension of water while the rock constituents are not so affected. "The surface tension of the water spreads around each sulphide particle like an envelope leaving, probably, between the surfaces of the water and the mineral a bubble of air



large enough to float the sulphide. No envelope is formed around silicates. The water appears to penetrate them and causes them to sink."

The process is conducted in a concentrator composed of a simple cast iron tube, six feet in length and one foot in diameter. Near each end are two tires resting on supporting rollers to enable the tubes to be revolved with little friction. Inside the tubes is a helical groove with an inch and a half pitch running from end to end, as in a bultnut.

"The tube is revolved at the rate of about 30 revolutions per minute. The pulp is screwed through the tube and is so guided by the helical screw groove as to gain the mineral particles repeated opportunities to glide upon the surface of the water. Good concentration can be made in one tube. The inventor's experiments showed, however, that when four tubes were joined in series so that one fed into the next one following, some of the finest particles did not get properly started on the water's surface until they had nearly reached the discharging end of the fourth tube.

"This process has been tried on a larger scale at the Adelaide Mill, Nevada. It was run with an ore composed of chalcopyrite, pyrrhotite, and pyrite with a little blende and galena which previous plants had failed to handle profitably. Each tube successfully treated from 5 to 6 tons of ore per twenty-four hours, concentrating in the ratio of 11 to 1."

Engineering and Mining Journal, October 3, 1908.—The cyanidation of silver ores at Pachuca, Mexico, is written of by Claude T. Rice. The Pachuca ore carries only five grams of gold per kilogram of silver. The ore milled averages about 700 grams silver and 3.5 grams gold per metric ton. The gangue is silicious. The silver occurs as chloride or bromide in the oxidized ore, and mainly as argentite in the unoxidized ore. Some of the ore shows a considerable amount of manganese and a little copper. The ore is completely slimed and air agitation of the cyanide solutions is being introduced.

PERSONAL AND GENERAL.

Mr. H. E. T. Haultain, whose appointment to the chair of mining, Toronto University, is noted on another page, has taken up his new duties.

Mr. Reginald E. Hore has resigned his position as lecturer in the University of Michigan to become lecturer on geology at the School of Mining, Kingston, Ont.

Mr. Aldridge, general manager of the Consolidated Mining and Smelting Co., was in Cobalt recently arranging for the shipment of low-grade ore to the smelter at Trail, B.C.

Mr. Douglas B. Langford, M.I.M.E., who was one of the guests of the Canadian Mining Institute's summer excursion, is at present in Toronto. Mr. Langford will probably spend the winter in Canada.

Prof. A. P. Coleman, of Toronto University, was returned from a two-months' exploration of portions of the Rocky Mountains west of Edmonton hitherto unexplored. An ascent of Mount Robson was undertaken by his party, but after reaching the 11,000-foot level they were forced to abandon the attempt to reach the summit on account of heavy snowfalls.

Mr. E. E. Stockton, of the Auditor-General's Dept., Ottawa, has returned from a visit to the Yukon, where he was engaged for four months on official business. He reports that the gold production of the territory this season will be larger than for many years past, owing to the operations of the Guggenheims, and for the first time the dredges will be busy until the ice forms late in October.

The following is a list of gentlemen elected to membership at a meeting of council held at Victoria, B.C., on September 21st: Members—Alexander Grant, Van Anda, Texada Island, B.C.; J. Edgar McAllister, M.E., Greenwood, B.C.; W. F. McNeill, Canmore, Alta; J. A. Miller, Rossland, B.C.; Geo. Wilkinson, manager South Wellington Coal Mines, Box 286, Nanaimo, B.C.; Mrs. Rosalind Young, 617 Michigan St., Victoria, B.C. Associates—W. Anderson, C.E., Box 666, Rossland, B.C.; H. P. Dickinson, general agent The Giant Powder Co., Box 95, Rossland, B.C.; Chas. F. Law, Vancouver, B.C.; A. B. Mackenzie, Box 222, Rossland, B.C.; Geo. Sheldon-Williams, Box 806, Vancouver, B.C.

Elected to membership at council meeting held at Temagami, Ont., Sept. 6: Members, A. C. Bailey, M.E., box 405, Cobalt, Ont.; Benjamin Browitt, Merritt, B.C.; Freeman I. Daniels, Cobalt, Ont.; Alexander Faulds, Middlesboro', Nicola Valley, B.C.; Ralph W. Foster, M.E., Cobalt, Ont.; Thos. Graham, M.E., Supt. of Mines, Western Fuel Co., Nanaimo, B.C.; H. W. Hardinge, M.E., 43 Exchange Place, New York, N.Y.; J. D. Hurd, M.E., Fernie, B.C.; Jas. Hylands, M.E., Box 18, Cobalt, Ont.; Herbert E. Jackman, M.E., care of Mr. L. A. Hoyt, East Jordan, Mich., U.S.A.; George Johnson, Cobalt, Ont.; M. C. H. Little, M.E., Cobalt, Ont.; J. L. Parker, M.E., care of Tyee Copper Co., Victoria, B.C.; John W. Russell, manager eKrry Mining Co., Cobalt, Ont.; Francis H. Shepherd, M.E., Box 353, Nanaimo, B.C.; R. J. Smith, 403, 1st Street, Manistee, Mich., U.S.A. Associates—Milton Carr, director City of Cobalt Mining Co., Cobalt, Ont.; Shirley R. Gragg, M.E., Haileybury, Ont.; Arthur W. McCurdy, president Nootka Marble Quarries, Limited, Victoria, B.C.; Frank B. Mosure, Cobalt, Ont.; T. J. Smith, president Diamond Vale Colleries, Limited, Box 439, Vancouver, B.C.

YUKON COAL.

Coal is coming to the front rapidly in Yukon Territory. Last year royalty was paid on 15,433 tons, three times the amount received during the previous year. The price of domestic coal in Dawson is $16 per ton. Tantalus and Coal Creek are the two sources of supply. Coal from the former place is used on the White Pass boats. The coal Creek fuel is used by the electric light plant in Dawson, which is under the same ownership. The Tantalus coal is the better of the two products.

The actual output of the Rand mines last month, as officially announced by the Transvaal Chamber of Mines in London was 587,634 ounces fine. This was 12,366 ounces below the estimates of a week ago as cabled to the Post, and just falls short of the August production, which established high record, having been 587,813 fine ounces.

INDUSTRIAL PAGE.

THE CARNAHAN SYSTEM OF BREAKING ROCK WITH MURPHY DRILL.

In hard rock one man can easily drill 45 feet a shift with our No. 1 Murphy Drill; 65 feet with a No. 2 and 90 feet with a No. 3, and he can put his holes in to take advantage of the ground the same as if he was doing the work by hand. The extreme simplicity and durability of the Murphy is embodied in the fact that there is but one moving part, and when one of our drills go under ground it goes there to stay. The miner does not lose time bringing them to the top for repairs.



After a little thought all miners will admit the advantages herein claimed for a hand-operated, unmounted drill. It is well established theoretically and practically that rock can be broken more economically by means of shallow holes put in, to take advantage of the ground and shot often, than by filling a heading with deep holes and shooting once a shift.

The reason why a heading is filled with deep holes where either old-fashioned machines are used, is because it takes so much time to set the machine up and take it down. The loss in time being enormous.

It is not practical to set up and take down a mounted drill twice or oftener a shift, as one cannot spend all his time in this way; a little time must be allowed for drilling, else progress would be very slow.

With any machine that takes no time to set up or take down and permits the holes to be put in just as they would by hand, there can be a great saving effected in power and in the number of feet of holes necessary to be drilled, over any of the old style mounted machines.

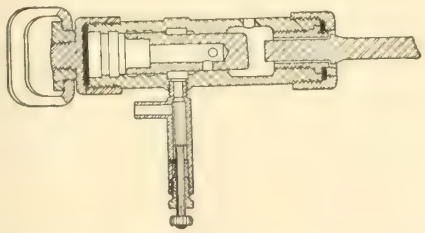
In order to get the good out of hand machines, the hole should not be put in deep, most of them not more than 48 inches. They should be put in to take advantage of the ground, and should be shot twice a shift or oftener, or, if this is impossible, the drill must have plenty of space to work in, as much as at least two headings or a long stope.

A small streak of ore can be kept just as clean when our machines are used, as if it was broken by hand. All miners will admit that in ordinary ground rock can be broken cheaper by hand than with the old style mounted drill if we leave out the question of time. Now, if this is admitted, the proposition becomes simple, for with a Murphy drill a man can drill with ease four times as much as he can by hand. He can put in the holes to take advantage of the ground the same as in hand work and use no more powder per ton of rock broken, than in hand work.

Now, we have only to figure on the cost of operating the machine. The wear and tear of the machine is very slight. We have had them running for six months without a single thing breaking or wearing out, and on an average they will not cost more than $3.00 per month to keep in repair.

The Murphy drill takes about one-third as much air as the two and one-half so called one-man baby machines.

These two items will cost less than one-half the wages of a man, therefore we can break in a day with one man,



using our hand drill, as much as four men could break by hand, with the expense of one and a half times the wage of one man.

From the foregoing description and cut it will be seen the Murphy air hammer drills are adapted to all kinds of practical mining, such as sinking, stoping, tunneling and block-holing; they are adapted to be used with solid or hollow steel, wet or dry.

A hand drill may be changed to a stoping drill, or a stoping drill to a hand drill, and that either may be changed to a water machine, or may be mounted on a column for tunneling. It is therefore possible to equip a mine with Murphy drills and use no other kind, as one line of repair parts will suffice for all machines. The repair parts for a Murphy drill are made strictly interchangeable and are suitable for all styles of our machines. We are the only manufacturers who can equip a mine with air hammer drills for all kinds of mine work. Some manufacturers can supply a hand drill for drilling dry only and a stoping drill for dry work only that cannot be mounted on column, but these are entirely different machines and require a different line of repair parts. Other manufacturers furnish water machine for tunnel work, but this must always be used on a column or cross bar, and its parts are not interchangeable with either the stoping drills or hand drills. You can readily see the advantage of having a line of drills with parts strictly interchangeable and at the same time a drill that is capable of handling all lines of mine work. The advantage of our system will be manifest to any miner. It is not necessary to carry so many repair parts, as the machines are all alike. When a miner has learned to run and understand one of our machines, he understands them all. When the mechanic understands one, he understands all. That these machines are unequal for speed for drilling, durability and minimum consumption of air for work prformed, will be testified to by the hundreds of miners who have recently adopted them.

The Murphy Drill is provided with what is claimed to be the only practical, automatic, lubricating device ever put on a drill. It is as excellent as it is simple. To reach the cylinder, the oil in the reservoir must pass through a leather gaskit, which is made of heavy sole leather, unperforated. The oil must soak through it. This it does just fast enough to keep the cylinder properly lubricated. This advice is more important than may appear at first sight, for miners are so notoriously careless about oiling their drills, and if a drill is not properly oiled it will not do nearly the work and will wear out earlier.

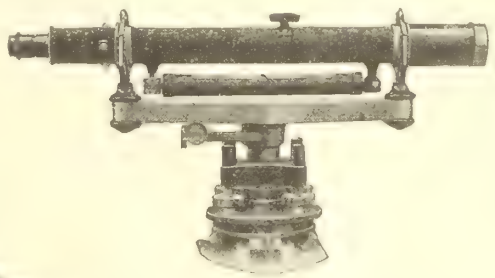
Examination of the cross cut will show the simplicity of the machine there being but one moving part. Every part can be readily removed and replaced if they should become worn as all repairs and parts are made strictly interchangeable. Anyone can understand it, anyone can run it.

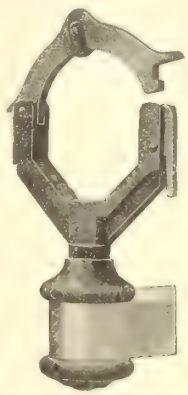
A NEW WYE LEVEL.

We show herewith a new Wye Level having several improvements, which has just been placed on the market by Wm. Ainsworth & Sons, the well known instrument makers of Denver, Colorado, U.S.A.

The principal parts of the instrument are made of the hardest bronze alloys to gauges, and, with the exception of the centres, strictly interchangeable. It has an 18 inch 35 power erecting (or inverting) telescope with 1⅜ inch objective, 8 inch 10 seconds level with graduations on glass, 11 inch bar, clamp and tangent, long steel centres of large diameter and four screw leveling head of improved construction.

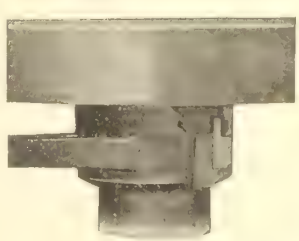
Especial attention has been given to the construction of the telescope, where owing to improved methods and by working to within limits of .00005 inch it has been possible to construct a telescope that will remain in collimation throughout its entire travel without making use of the objectionable object slide adjustment, which until now has been the only solution of this difficulty.





The Wyes are of light but rigid construction with improved spring latches for locking, that are quickly operated and very solid. The clips carry fibre tipped spring plungers that hold the telescope firmly in the wyes.

The leveling head is of the same construction as that used for their transits but without shifting center; and owing to especially accurate construction cannot be cramped in any position.



The spindle and clamp are protected against the entrance of dust by a light ring threaded onto the spindle which carries on its inner diameter a felt ring that is in constant contact with a projecting ring on the clamp.

The instrument is packed with the usual accessories in a mahogany carrying case, the telescope being removed from the Wyes to prevent damage to the collars when carrying and while in transit.

This instrument and an improved Railroad Wye Level are fully described in bulletin BX-16, which will be sent on request.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, Oct. 2, 1908.—The pall of smoke which during the latter half of September covered the River St. Lawrence and extended far into the Gulf forbade all navigation for a space of seven or eight days, and caused a great deal of enforced idleness at the mines. The output of the Dominion Coal Company's collieries, for example, would under ordinary circumstances have reached 330,000 tons, but in consequence of the numerous shutdowns that were found necessary, it has amounted to only 260,000 tons.

It has been a striking object lesson on our dependence in Cape Breton on the St. Lawrence market as an outlet for our coal production. At the very least one-half of the saleable output of the Cape Breton collieries is market up the St. Lawrence. It is a peculiar trade. The season is rendered very short by the climatic conditions, so short indeed that it is beyond the capacity of the mines to produce the shipments required during the six or seven months of open navigation. In order, therefore, to equalize production and distribution as much as possible, large banks or stores of coal must be accumulated at the mines during the winter, and equally large stores must be accumulated at the discharging points in order to carry the requirements of the trade over the season of closed navigation. Such a trade requires a large amount of capital, first for transportation, and secondly for wages in order to carry the workmen over the winter and provide the stores of coal required for the summer. This trade is also subject to strenuous American competition, and is altogether beset by so many difficulties and so nicely balanced that very little is needed to render it an unprofitable one. It is, therefore, of the utmost importance to Cape Breton that no legislation be passed that would tend to increase the difficulties of this trade, which has no parallel anywhere, that we are aware of. Any such law as an Eight Hours Act, for instance, might have far-reaching and disastrous consequences that its light-hearted advocates do not foresee.

Mr. Kier Hardie, the leader of the Independent Labor party in England, recently addressed a meeting in Glace Bay, which was held in the interests of the United Mine Workers of America. Mr. Hardie recently achieved notoriety by preaching sedition to the natives of our Indian Empire, and we understand his mission in Canada is to help in the formation of a Labor party in the Federal House similar to that of which he is the leader in England. We hope Mr. Hardie's extensive tours are improving his knowledge of geography, because he needs lessons in that particular science, especially as it applies to the British Empire. It is just about a year ago that Mr. Hardie received a letter from Woolongong, New South Wales, Australia, complaining of the bad state of trade in the coal mining region of New South Wales. Mr. Hardie immediately wrote to leading newspapers in England warning miners not to accept invitations to go to "certain unspecified mines near Sydney, Nova Scotia," and finished his letter by saying that he hoped his warning "would not be in vain." Perhaps it may by this time have penetrated Mr. Hardie's consciousness that Sydney, Nova Scotia, is in Canada, and not in Australia. We never heard that Mr. Hardie acknowledged his error or tried to remove the effects of his letter, although it was promptly contradicted by the Agent-General for Canada in London.

Another gentleman who spoke at this same meeting conveyed some remarkable information to his hearers, from which it appears that we have been living in blissful ignorance of our woeful state. Mr. Sherman, the gentleman in question, and a vice-president of the U. M. W. A., told his audience that they compared very unfavorably with the miners of the West, and that their faces showed that they worked in "ill-ventilated mines." Anyone who knows the Cape Breton miner will smile at this statement, and take it just for what is is worth. When one speaks of the native miner of Cape Breton it must be remembered that he comes of an ancestry of miners, and that he is one of a very distinct race. Out in the West they have no indigenous race like the Highlander of Cape Breton. The miners of the West are gathered from all parts of the world, and it is more than possible that the fine specimens Mr. Sherman has seen there were born down here. It is rather more than likely. But it would be a work of superfluity to attempt to prove the superiority of the Cape Breton miner's physique. Everybody knows it. As to the ventilation of our mines, we think Mr. Sherman is as far astray as he is on the other matter.

The mines of Cape Breton need fear no comparison with any mines on this continent, or for that matter on any other continent. Our mines are well ventilated, well laid out, superbly equipped, and safety is a prime consideration in their management. Mr. Sherman can bring ordinary mortality statistics, ordinary and fatal accident rates, ventilation figures and anything he likes from the West, and we will go one better in Cape Breton, every time. We would remind Mr. Sherman that it is always well to speak a modicum of the truth, and to suppose some spark of intelligence in the audience, even in the benighted East.

ONTARIO.

Cobalt.—The Kerr Lake Mining Company.—The Annual Report of the Kerr Lake Mining Company for the year ending August 31st has been issued. Great credit is due to the management of this company for the complete information furnished and the general excellence of the report.

During the fiscal year a total of 1,473,712 ounces of silver were produced at an estimated value of $787,554. The cost of producing this ore, including all development costs in the mine, shows a total of $139,530.97, leaving a gross profit of $643,023.76. The average value per ton is over $1,500.

Accompanying this report are maps showing the underground development and the surface plants, etc. On vein No. 7 a shaft 180 feet deep has been sunk. On vein No. 3 a depth of 325 feet has been reached. Considerably over a mile of underground work has been done. Five veins on this property have already been located in which ore has been blocked out. Vein No. 3 has produced 168 tons, and vein No. 7 363 tons. Less than 25 per cent. of the property has been developed, but from the valuable veins uncovered in the development work so far done there is every reason to believe that other veins of equal richness will be encountered with further development work. The showing of the property for the yast year is a remarkable one.

The following is the statement of the Secretary Treasurer of the assets and liabilities:—

"To the Shareholders and Directors of the Kerr Lake Mining Company:

"I herewith submit my report of the Assets and Liabilities, together with Profit and Loss account, for the fiscal year ending August 31st, 1908.

"It is most gratifying to be able to report to you that I received the sum of $740,435.80 from the sale of ore during the year. There is still outstanding and due to us by the smelters $116,772.76, making a total of $857,208.56.

"The entire plant, including machinery and buildings, has been charged off to Profit and Loss.

"In previous years amounts received from the sale of ore have been as follows:—

In 1906	$176,717 00
In 1907	347,855 38
In 1908	857,208 56

showing a steady increase.

"Dividends paid were as follows:—

In 1906	$190,000 00
In 1907	210,000 00
In 1908	360,000 00

"The whole is respectfully submitted.

"By order of the Board,

"JACOB A. JACOBS,

"Secretary-Treasurer.

"New York, City, N.Y., Sept. 23rd, 1908."

La Rose.—The net earnings of the La Rose Mine for September were $101,000, as compared to $108,000 for August, $127,329 for July, and $82,807.55 for June.



Kerr Lake Miners Winning Drill Contest, Labor Day.

City of Cobalt.—The City of Cobalt Mine is rapidly coming to the front as a producer of high-grade ore. In the week ending October 2nd 191,600 pounds of ore was shipped, placing the City of Cobalt fifth in the list of shipping mines. Up to and including October 1st practically 500,000 ounces of silver have been taken out of the property, netting approximately $250,000. On July 3rd a dividend of 3 per cent. with a bonus of 2 per cent. was distributed. On October 15th a dividend of 3 per cent. with a 2 per cent. bonus will be distributed. It is estimated that the ore in sight guarantees a quarterly dividend of 5 per cent. for four years. A new plant is being installed, consisting of a 12-drill Sullivan compressor, enlarged boiler capacity, etc. The main shaft is down 137 feet. Approximately 1,000 feet of drilling has been done at the 65-foot level. Three hundred and fifty-six feet of drifting and cross-cutting has been done at the 137-foot level. In a cross-cut from the lower level a vein known as No. 2 was encountered, and a winze sunk on this vein 60 feet, and at 200 feet a new vein was struck, which is about six inches wide and carries very high values of native silver.

Silver Cross.—Mr. Lewis Jennings, who controls the Silver Cross Mine, has just completed arrangements to resume work on the property. The No. 1 shaft was sunk to 100 feet, and No. 2 shaft to 46 feet when work was discontinued. The No. 2 shaft is on a very wide true vein of calcite and cobalt. This vein will be cut at the depth of 200 feet with a diamond drill. A force of men will be put to work at once trenching, and a diamond drill started. The property is well located, and the formation is very favorable.

Cochrane Cobalt.—Arrangements have been made for the sale of sufficient treasury stock of the Cochrane Cobalt Company to provide funds for thorough development of the property. This should add a new shipper to the S. E. Coleman district, as the indications are exceedingly favorable, and the property is undoubtedly a valuable one. Mr. Floyd Harmon, who developed the Temiskaming Mine, will have charge of the Cochrane. Mr. Harmon has had a very extended experience in the Cobalt field, and under his management the property will be developed to the best advantage.

The Beaver Mine.—At the 200-foot level from the main shaft a drift is being driven in to cut a number of veins which were located at the 75-foot level. Seven veins in all have been cut at this level, and all of these showed every indication of values at depth. The experience of Temiskaming and Shamrock, which adjoin the Beaver on the south and north, has shown that the silver values are not located at or near the surface. Developments at 200 feet should prove up some important vlaues.

The Silver Cliff.—The Silver Cliff Mine, which is operated by a syndicate of Toronto capitalists, is rapidly taking its place as one of the important shipping mines of the camp. Since the present management took possession on July 1st over $125,000 worth of ore has been taken out. Several new veins have been opened up, and the No. 1 vein proved to carry high-grade ore from the surface to the 170-foot level. The main workings of the mine are from a drift into the face of a high bluff, making mining very inexpensive.

Temiskaming and Hudson Bay Company.—At the annual meeting of the shareholders of the Temiskaming and Hudson Bay Company the directors were authorized to issue 23,238 additional shares of stock at the par value of $1 per share to stockholders, at a ratio of two shares for each one share held. The capital stock issued is 7,246 shares of the 25,000 shares of authorized stock. The shares are quoted in the market around $220 each.

It is understood that the new issue is made at the request of brokers, in order to facilitate trading in the stock.

The President reported that the patent to the lot in dispute would be issued by the Government on agreement of the company to pay a royalty of 15 per cent. of net proceeds received from the smelters.

The Red Rock Mine.—The Red Rock Mining Company has gone into liquidation, owing to a debt of $10,000. The directors of the company are as follows: F. P. Chapin, President; A. E. Dyment, Vice-President; R. M. Green, Secretary-Treasurer; R. R. Gamey, A. E. Osler, and N. S. Thompson.

The capitalization of the company is $1,000,000; the stock was all issued. At one period there was every indication that the territory around the Red Rock and Green-Meehan would prove to be very valuable, but the history of both these properties has been unfortunate.

The Otisse Claim.—The Otisse property at Silver Lake, in the Montreal River district, has just been sold to a Toronto syndicate organized by Mr. E. D. Warren. This property has undoubtedly the best surface showing of any of the claims in the Montreal River district, and the development of it under proper

management will do more to promote the interests of the district than anything so far in the history of the outlying camp. A large sum of money was paid out for the property after reports by first-class engineers, and sufficient capital has been provided to thoroughly develop the property. Mr. Frank C. Loring, who has been for some years prominent in the Cobalt District, is to have general supervision of the development work. Mr. Loring is interested also in the promotion. Although no sinking has been done and practically no trenching, twenty-two veins have been located on the property, six of which show native silver. If development with depth shows a persistence in the silver content, the Otisse property will undoubtedly be an important factor in the silver production of the district.

BRITISH COLUMBIA.

Rossland.

The Rossland mines are working along more steadily than the mines of any of the surrounding districts. During the whole of this year they have maintained their regular shipments from week to week, making no runs to high record marks nor falling below their general average. The Boundary mines have been affected by difficulties arising from lack of coke, money and cars, but none of these conditions have affected the Rossland mines to a noticeable extent this year.

The Centre Star, Le Roi, Josie, Giant-California, St. Elmo and Evening Star have appeared on the active shipping list during the past two weeks, and the situation throughout the camp generally is one of persevering activity.

While much might be said of the every-day work at the Centre Star and Le Roi mines, nothing out of the ordinary has occurred. Ore is being opened up in a satisfactory way and the usual development and mining operations have been carried on. On the Surprise property of the Le Roi 2, Ltd., a tunnel has been started towards the ledge. At the Giant-California, having failed to cut the sought for ore body with the long cross-cut, the operators are now doing considerable diamond drill development, by means of which it is hoped to locate the continuation of the lode known to exist in the Annie claim of the Le Roi Two, adjoining, which ore has been followed up to the side lines of the California. The location of ore in the Giant-California means much to Rossland camp in an economical way, and it is hoped that this concern will be repaid in a rich manner for the great amount of developement work they have done on the Giant-California during the past eighteen months.

At the Le Roi mine during the month of August they expended $9,000 on development work, in the course of which a good body of ore was encountered on the 1,650-ft. level. The quantity of ore shipped to the Northport smelter was 6,191 tons, which carried 2,837 ounces of gold, 3,350 oz. silver, and 147,000 lbs. copper. The estimated value of the gross output is $77,000, and the profits $15,000 for the month. The Le Roi has been making good progress during all of the present calendar year, and a good report from the directors for the past fiscal year should be the result.

It is reported that they have exposed a five-foot ledge of good-looking ore on the Inland Empire. No assays are yet to hand.

From time to time the Consolidated Co. has been disposing of the machinery contained in the huge structure erected several years ago for the reduction of Rossland pyritic ore, and which is situated at Trail, B.C. Most of this machinery has been shipped to the various mines of the Consolidated Co., where it has been put to use advantageously. Most of the concentrating machinery proper has been shipped to the St. Eugene concentrator, and the concentrator at Trail is fast being dismantled. The Rossland Power Co., the organization that launched this enterprise, after several months of apparently successful experimental work at Rossland, met with a heavy loss and much disappointment when it was found that the idea was not practicable. The concentrator was too far from the mines, and freight rates, loss in the tailings and general recalcitrant character of Rossland ore led to its failure. The capitalization of the Rossland Power Co. was originally $600,000; when it was absorbed by the Consolidated the assets of this company were taken in at $60,000, and even at that it is safe to say the Consolidated Co. will incur some loss after the transaction is cleared up.

There has been a lot of work done towards the concentration of Rossland low-grade ore. A cyanide works on Sheep Creek, below the camp, started off to revolutionize mining in this section some years ago, but was a dismal failure. The Le Roi Co. has an experimental concentrator on the Black Bear claim consisting of crushers, Chilian mills, settlers, Wilfley tables, etc., which is standing idle at present.

The White Bear stamp mill, Wilfley tables and oil plant are idle, but it is said that this concern made a small profit on their concentrating, while working. Several inventors have brought in their tables for catching the gold and other values in tailings, have been seen working at the foot of the ore dumps for a time and have eventually boxed up their tables and moved to other fields. The Le Roi Two, Ltd., have been working their concentrator steadily for the past couple of years. During the month of August they shipped 69 tons of concentrates, which netted them $950, or $13.76 per ton. This figure, after deducting cost of mining and treatment in the concentrator, leaves them a good profit. It may be said, however, that the "second-class ore" of the Le Roi Two is of a higher grade than that of either the Le Roi or Centre Star mines.

Boundary.

Having survived the coke shortage in good form, and having run the weekly shipments once more up to the high tonnage mark, the big producers of this district are now threatened with a setback in the shape of a car shortage, there being a lack of cars to haul fuel, owing to the demand for cars to take the big wheat crop of the North-West to the Eastern shipping points. The shipments from the district for the week ending Oct. 3 were but 34,959 tons, as compared with the week ending September 19, which totalled 41,230 tons. The Granby, Snowshoe, Mother Lode and Oro Denoro were the only shippers during the week ending October 3.

The mines of the Dominion Copper Co. have been shut down for the present, only a pumping crew being retained at the mines. The company has drifted into such a position, in consequence of the very low price of copper, that it is believed that nothing short of reorganization will place it where they will be able to make their mining and smelting operations pay; that is, considerable capital is required to get the enterprise into good working form, and it is likely that a receiver will be appointed and the company reorganized. The mines of this concern never looked better, and they were working along in good shape until the coke shortage, which followed the Fernie fire, gave them just enough of a setback to precipitate matters. In order to finance the 10 per cent. sinking fund requirements of the $800,000 outstanding bonds, in June last, it is stated that many of the large bondholders took notes for their interest, and now that other heavy payments are about due it is felt that the most expedient thing to do is to get the business organized on a good basis before doing any more work. It is safe to say that when this reorganization has taken place and the company has sufficient funds to make a good start, and equip the mines and smelter with up-to-date ore handling machinery in every respect, then this company will be able to forge ahead to the ranks of profit payers, for their mines are certainly as good

as other Boundary properties that are being made to pay and, in some respects, the ore found in them carries higher values.

The big find of chalcopyrite in the Emma mine of the B. C. Copper Co. has done much to stimulate development in the Greenwood district, and has, to some extent, been an aid to the formation of a company to develop the valuable Greyhound group of mines that adjoin the property of the B. C. Copper Co. The B. C. Copper Co. is now working, in addition to the Mother Lode and Oro Denoro mines, and the properties recently acquired in Wellington camp, the Napoleon and Acme mines, and other properties in the State of Washington just across the Boundary line. At the Napoleon they are extracting 200 tons of ore per day that will average $13.35 per ton. This output can, and will, be considerably augmented when copper advances. The Athelstan Fraction and Molly Pritchard claims which the B. C. Copper Co. recently bonded for a figure around $100,000, will prove valuable to them, inasmuch as the ore is useful as a flux, and in addition carries paying quantities of gold and silver.

A car of ore has been sent by the Consolidated Co. from the War Eagle, Phoenix, to the Trail smelter. The Granby Co., after much experimenting, are now fitting their powder thaw house with an apparatus whereby air-warmed by electric coils will be driven into the thawing room, and they will do away with the steam. It is thought that the air will thaw the powder in a more uniform away and will be less liable to cause accidents than any other form of heat.

Nelson.

The Silver King mine at Nelson has resumed ore shipments, the product now being treated at the Trail smelter. A series of test runs have been made at the Granite-Poorman mine by the lessees. The highest returns were $2,300 for the nine-day run; other runs netted $1,200 and $1,100. The gold obtained from Granite ore is quite coarse, and is mostly caught in the batteries. Twenty tons of concentrates were also obtained in addition to the gold for the three test runs. Experts have been examining the May and Jennie claims of the Reliance Mining Company for American capitalists. The Fisher Maiden mine has made a shipment of 22 tons of sacked ore to the Trail smelter.

A body of $100 ore has been opened up on the Second Relief mine, Salmo district. This ore will not be put through the mill, but is rich enough to ship direct to the smelter. Fifteen men are at work on the Yankee Girl property. The Arlington is shipping 100 tons of $75 ore per month. The control of this company is largely held by English capital.

A body of good shipping ore has been encountered in the workings of the Aurora, across the lake from the St. Eugene. The concentrating ore found in the lower tunnel carries 11 oz. silver and 24 per cent. lead. The operators are confident that they will find a continuation of the St. Eugene lead, and development work is being continued. Several carloads of ore on the Society Girl will be shipped over snow roads to the reduction works this winter. A new boiler-house is being erected at the St. Eugene. The mine is working and shipping steadily, and is looking good all through.

GENERAL MINING NEWS.

NOVA SCOTIA.

North Sydney.—A continuation of the Collins coal seam has been discovered underlying the seam operated by the Mackay Mining Company.

Halifax.—On the property of the McCallum syndicate fourteen veins of scheelite have been cut. Production on a small scale will soon be commenced.

West Gore.—It is rumored that the legal difficulties in which the Dominion Antimony Company was involved are now cleared away, and that work is to be resumed.

ONTARIO.

Cobalt.—Several properties have been added recently to the list of those being worked under lease. Among these are some of the Davis Silver Cobalt Mines Company's claims. The custom of working on lease is widespread in metalliferous districts in the United States.

Bancroft.—The sodalite property near this place has changed hands. Mr. T. Ludyard, the former owner, has sold it to an English syndicate. It will be operated continuously.

BRITISH COLUMBIA.

Ashcroft, Sept. 26.—Mr. J. C. Gwillim, Professor of Mining at the School of Mining, Kingston, Ontario, has spent part of this summer inspecting the Telkwa, Bulkley and Babine districts of Northern British Columbia, on behalf of the Consolidated Mining and Smelting Company.

"Concerning mineral resources," writes Mr. Gwillim, "ores of lead, silver and copper have been found over a very large territory, but little has been done in the way of development. The distances are great, and at present the transportation is all by pack animals. A wagon road is being built from Hazelton to Aldermore, a point sixty miles south from this trails of twenty and thirty miles branch off into the mountains on either side. The country is a favorable one to prospect, but development and cheap transportation must come about before there will be any production of large tonnage.

"Anyone entering the district at this stage should receive easy terms and plenty of time to develop mineral properties, because the cost of development will be great, and also experimental, and the time of realizing from ore production cannot come until the Grand Trunk Pacific is on a shipping basis.

"The Telkwa Mines, the Telkwa Mining, Milling and Development Company, and James Cronin, deserve much credit in opening up the properties which they have under such disadvantages in the matter of long pack trails and insufficient skilled mine labor and equipment.

"Rumors and reports from Ingenika and McConnell Creek are not optimistic."

Nelson.—The Kootenay exhibit of ores at the Spokane Fair is expected to win the cup offered for the best exhibit. Messrs. T. G. Proctor and A. H. Gracey have been active in the movement. Mr. T. Brown is in charge of the exhibit.

Nelson, Oct. 3.—The shut-down of the Boundary smelters in the earlier months of the year has not affected the ore outputs of Boundary and Kootenay to as large an extent as was expected. The total output to date is 1,332,854, as compared with

1,364,271. Both the Boundary and Rossland districts show increases—70,061 and 5,937 tons respectively. The falling off of Slocan outputs is the present drawback.

Nelson.—On September 21st a delegation, consisting of Messrs. R. Irving, F. T. Snyder, L. Pratt, and J. Whittier, representing the Canada Zinc Company, waited upon the City Council of Nelson for the purpose of requesting that the refusal of the city to turn on their electric power over the company's lines be reconsidered. The decision has been left to Engineer Cecil B. Smith.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Messrs. Bolckow, Vaughan & Co. have acquired the Belmont iron ore mines near Guisborough-in-Cleveland, and will shortly reopen them.

The annual report of the Labor Department of the Board of Trade shows an increase of miners' wages during 1907 in every coal field, ranging from 15 per cent. in Lancashire, Yorkshire and the Midlands, to 43¾ per cent. in Scotland. The total number of workpeople affected was 806,339, and the net amount of increase in weekly wages was £173,613.

The question of the afforestation of mountain lands in South Wales is being prominently discussed in its relations to the mining industry. It is urged that the unemployed could be furnished work in planting spruce and fir trees near the collieries to furnish a home growth of pitwood, which would compete with the foreign-grown wood now imported, and keep down prices.

BELGIUM.

Out of 42 blast furnaces in Belgium, only 30 are in operation. The output of pig iron for the first eight months of the year was 782,700 tons, as compared with 950,640 tons for the corresponding period of 1907.

RUSSIA.

Coal has been discovered near Tschernowskoje, on the Transbaikal Railway, the deposit being estimated at not less than 600,000,000 poods. A syndicate is being formed to take over all the collieries in the district.

A geological survey undertaken this year in the Simbursk government has disclosed rich deposits of bituminous schist, a large quantity of which is fit for fuel, also sulphur and phosphorites, including a considerable quantity of phosphoric acid.

AUSTRIA.

Two Heroult electric furnaces for steel manufacture, one of 2½ and the other 3 tonnes, were recently installed at the works of Messrs. Bohler, at Kapfenburg, Styria.

AUSTRALASIA.

At the South Blocks, Broken Hill, New South Wales, the cost of copper production has been reduced to a minimum of 15s 0¾d per ton.

The Victoria Minister of Mines, in a recent speech, stated that the latest information from the State geological surveys showed that there were 350 miles of auriferous reefs in Victoria, of which it was estimated that 250 miles were not payable at present, although they might be some time.

The Anchor Company, which has spent £100,000 in tin mining operations in Tasmania without being able to pay dividends, is asking a loan of £5,000 from the State Government.

The main shaft in the North Lyell copper mine, Tasmania, is down 90 feet below the 1,000-foot level, and the next level will be run at 1,100 or 1,150 feet.

The State coal mines of New Zealand during the year ending June 30th shipped 237,309 tons of coal, valued at £109,259, of which 115,172 tons were supplied to the Railway Department and the remainder to shipping companies and private consumers.

JAPAN.

In the Province of Satsuma there are now nearly 200 gold mines, the annual output of which is estimated at three million yen. One of the most important is owned by Prince Shimazu, and embraces 2,360 acres, worked by modern methods.

UNITED STATES.

A deal is reported between the Hubbard-Elliott Mining Company, owning extensive copper properties in Alaska, and L. Hirsch & Co., of London, England, involving the formation of a new corporation capitalized at $30,500,000.

A $1,500,000 concentrating plant is to be erected by the Oliver Iron Mining Company on their property at the west end of the Mesabi range.

Advance figures published by the United States Geological Survey give the gold production of California for 1907 at $16,727,928, a decrease of $2,004,525. Silver was produced in the State to the value of $751,646, a decrease of $66,182.

The Westmoreland Coal Company, of Pennsylvania, has completed plans and appropriated $1,000,000 for the development of a tract of 20,000,000 acres in Westmoreland County. Two mines are to be opened and a new mining town founded, which will be named "Yukon."

The H. C. Frick Company is about to erect three new coke plants in the Connellsville district, Pennsylvania, at a cost of about $4,000,000.

SOUTH AFRICA.

Owing to an increase in the demand for diamonds in the United States and Britain, the De Beers mines, which had been working short time, have resumed full operations.

The Natal Government will appoint a commission to enquire into the best means of developing the mining industry and to revise the mining laws.

MEXICO.

Coal has been discovered on the Laguna de Palos Blancos land in the Mocorita district of Sinaloa. It is reported that there are indications of a large deposit of good commercial quality.

A contract has been made by Manuel Cuesta Gallardo, of Guadalajara, with Siemens-Schuckertwerke, of Berlin, Germany, for electrical machinery worth over $7,500,000 for power and irrigation enterprises, including the supplying of electric energy to the Amparo Mining Company in the Etgatlan district.

COMPANY NOTES.

AUGUST REPORT OF LE ROI.

Shipped from mine to Northport during the past month, 6,191 tons of ore, containing 2,837 ounces of gold, 3,350 ounces of silver, and 147,000 pounds of copper. The expenditure on development work during the month was $9,000. Have discovered a good body of ore at the bottom of the mine, 1,650-foot level, south vein; grade of ore varies, but is considerably above the average value of other parts of the mine. According to the above, the gross value of the output was $77,000, which value means that a profit of about $15,000 had been made for the month of August.

FINANCIAL STATEMENT OF THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA, LIMITED, FOR YEAR ENDING JUNE, 30TH, 1908.

LIABILITIES.

(*Continued from last issue.*)

FINANCIAL STATEMENT.

After writing off $132,843.20 depreciation upon plant and equipment (as compared to $91,705.50 depreciation marked off during the previous year), $27,127.55 on account of depreciation of stores and doubtful accounts, and charging to profit and loss account $564,226.06 expended upon development, the operating profit shown is $43,415.93. Having provided for the above, and the payment of dividend No. 7, amounting to $66,940.00, the balance at the cherdit of Profit and Loss Account is $32,061.93.

As mentioned in the Annual Report of the previous year, due to circumstances beyond the control of the Company, the stock of ores and metals on hand June 30th, 1907, was very large. Before it was possible to market these metals, their values commenced declining rapidly. The fall in prices during the year is shown by the following quotations:—

	London. Lead.	New York. Silver.	New York. Copper.
June 30th, 1907.....	£20 0 0	67¼ Cents	22⅛ Cents
June 30th, 1908.....	12 5 0	53⅝ Cents	12½ Cents
Difference	£7 15 0	13⅝ Cents	9⅝ Cents

Had it been possible to market the metals on hand June 30th, 1907, at quotations of that date, and to market the metals contained in the ores received during the year at the same quotations as those allowed the mines, then the Consolidated Company's profits would have been increased by over $430,000.

During the year additions to the various plants have amounted to $315,562.22, and the cost of new properties and their development to $621,894.73, or a total of $937,456.95. This amount has been provided by the payment of $416,056.95 cash from working capital. The balance of $521,400 is represented by capital stock issued in payment for new properties.

The Snowshoe overdraft guaranteed by the Consolidated Company has been reduced from $46,196.07 to $29,707.92.

The advance to the Canadian Metal Company of $125,000 (secured by a first mortgage upon the Bluebell Mine and Concentrator, and Frank Zinc Smelter), will be repaid October 31st, 1908. A portion of the above advance was used in the construction of a concentrator at the Bluebille Mine, which is now in operation. The product is being regularly shipped to Trail for treatment.

DEVELOPMENT.

There are 19 miles of underground development or narrow work in the Centre Star Group, 12½ mlies in the St. Eugene, and 3,300 feet in the Richmond Eureka. The Consolidated Company has done 1,366 feet of narrow work and 1,348 feet of diamond drilling on the Snowshoe Mine. The Phoenix Amalgamated has a total of 800 feet of narrow work, a number of open cuts, and 1,749 feet of diamond drilling.

Following is the development or narrow work (given in feet) which has been driven during the year:—

	Drifting.	Cross Cutting.	Raising.	Sinking.	Total.	Diamond Drilling.
Centre Star and Idaho	7.218.0	3,152.0	481.5	518.5	11,370	10,032.9
War Eagle and Iron Mask....	2,568.5	661.0	418.5	100.5	3,748.5	4,160.1
St. Eugene	7,934	1,843	2,596	266	12,639	4,569
Richmond Eureka	1,125	266.0	313	0	1,704	0
Snowshoe	358	205.5	351.5	0	915	1,126
Phoenix Amalgamated .	0	246	75.0	30	351	1,749

The ore reserves in the Centre Star Group, Rossland, have been increased. Shipments from these properties for the year have been 175,799 tons, containing a gross assay-value of $1,915,953.79 as compared to 81,788 tons containing a gross assay-value of $893,249 during the previous year.

The lower workings of the War Eagle and Iron Mask Mines have been producing high-grade ore during the year. For example, during the month of June, 2,133 tons were shipped, containing a total gross value of $50,700, or nearly $24.00 per ton. The occurrence and development of this higher grade product in depth are encouraging features of the year's operations.

The 12th level Centre Star has yielded a large tonnage. The 13th and 14th levels have only, as yet, added slightly to the ore resrves, but prospecting is still incomplete upon these levels.

The Centre Star Shaft is now 20 feet below the 16th level, which makes a total vertical depth below the collar of the shaft of 2,050 feet, and measured along the slope 2,183 feet. Within another month sinking will be stopped and the prospecting and developing of the 15 and 16 foot levels commenced.

Large bodies of heavy sulphide ore have been found in the Idaho, but the gold contents have been disappointing.

The probable ore reserves of the St. Eugene Group, Moyie, are nearly 50 per cent. greater than a year ago. Ore 50 per cent. better in grade than last year's average has been found between the 1,900 foot and 2,000 foot levels. Between the 1,700 foot and 1,800 foot levels a new avenue, called No. 2½, has been located, and this avenue has also been found and partly developed upon the 1,900 foot level. Another new avenue (which will be designated as Fifth Avenue) located approximately 120 feet farther in the hill than Fourth Avenue, is being developed on the 1,900 foot and 2,000 foot levels.

In the report of last year it was mentioned that the 2,000 foot level did not promise to yield as much tonnage as the 1,900 foot level, but present indications are that the 2,000 foot level will produce more than the 1,900 foot level, or any other level in the mine. The grade of the ore is, however, lower than that produced from the upper workings. Some bodies of low-grade matrial have been found on the 2,100 foot level, and a raise from this level shows ore of workable grade. Prospecting upon this level is still incomplete. Drifting and cross-cutting upon the 2,200 foot level are progressing, and one or two low-grade ore bodies have been found. It will require six months or a year to determine the amount of ore upon this level.

The main St. Eugene shaft is 24 feet below the 2,400 foot level or 749 feet vertically below the collar of the shaft.

The Richmond Eureka, at Sandon, is developing very satisfactorily. An aerial tramway was completed last January, and regular monthly shipments of 250 tons of ore are being made,

containing approximately lead 18.5 per cent, silver 55 ounces per ton. The probable stoping area is seven or eight times greater than was estimated a year ago.

Prospecting upon the Phoenix Amalgamated Group was started last summer, but was discontinued at the time the Snowshoe Mine was closed. It was decided to postpone further prospecting until the latter resumed operations. A large amount of low-grade ore, containing a sufficient excess of iron to make it profitable to mine. The extent and commercial value of this body is not yet known.

The tonnage developed in the Snowshoe Mine (leased by the Consolidated Company) is the same as last year. No ore has been found below the faults which cut off the ore bodies in depth, but the chances are favorable for finding additional ore bodies near the surface.

The Snowshoe Mine was shipping 25,000 tons per month when the general demoralization of the copper market occurred. For this reason the mine was closed in November, 1907. The prices for copper having improved, and the general situation being better, it has been decided to commence shipments within the next few weeks. The average assay of 135,500 tons shipped by the Consolidated Company has been: Gold, 0.59 oz.; silver, 0.32 oz.; copper, 1.3 per cent.

CONSTRUCTION AND IMPROVEMENTS.

The amount expended upon new construction and improvements during the year amounted to $315,562.22. A portion of this amount was used in completing work started during the previous year, and most of the remainder upon the following:—

Equipment of the Richmond Eureka Mine, including an aerial tramway; buildings and equipment at the Phoenix Amalgamated; sorting plant and extensions to the St. Eugene Mill for increasing its capacity and efficiency; additional Huntington and Heberlein Plant at Trail; new anode plant at Trail; electric locomotives, and other electric installations.

RESULTS AND MANAGEMENT.

While the financial results have not been satisfactory, the operating profits having been absorbed by the heavy losses experienced in handling metals on a rapidly declining market, yet from an operating and metallurgical standpoint, the year was a decided improvement upon the one preceding; that is, the tonnage handled was much greater, the values (excepting in the St Eugene) higher, and the recovery of metals and costs at the Trail Smelter and regnery better. Eliminating losses in quotations, the operating profits were larger.

These satisfactory operating resuls are due to the excellent work of the many employees at the various properties, and to the following gentlemen:—

R. H. Stewart, Manager of the Company's Mines; Jules Labarhe, Manager of the Trail Smelter and Refinery; T. W. Bingay, Comptroller; William Chambers, Superintendent of the Smelter; John F. Miller, Superintendent of the Refinery; A. J. McNab and James Buchanan, Metallurgists; R. Purcell, Superintendent of Rossland Mines; S. G. Blaylock, Superintendent of St. Eugene Mines; Charles Biesel, Superintendent of Phoenix Mines; A. W. Davis, Superintendent of Richmond Eureka, and John M. Turnbull, Mining Engineer.

Respectfully submitted,

W. H. ALDRIDGE,
Managing Director.

NOVA SCOTIA STEEL AND COAL CO., LTD.

A dividend of two per cent. on the preferred shares of this company, for the quarter ending September 30th, 1908, has been declared payable on October 15, 1908, to shareholders of record of September 30, 1908.

The transfer books will be closed from the 1st to the 5th of October, both days inclusive.

Granby, for the year ending June 30th, shows a deficit of $320,576, compared with a surplus of $228,019 in 1907, and a surplus of $1,013,617 in 1906. The comparative statement follows:—

	1908.	1907.
Copper, lbs.	21,126,926	16,410,576
Silver, oz.	300,593	257,378
Gold, oz.	40,139	35,083
Gross earnings	$3,790,184	$4,521,548
Charges, etc.	3,435,760	2,673,529
Net profit	$354,424	$1,848,014
Dividends	675,000	1,620,000
Deficit	$320,576	*$228,019
Previous surplus	2,775,757	2,547,738
Profit and Loss surplus	$2,455,181	$2,775,757

*Surplus.

Crediting surplus after charges, etc., $354,424 with the $228,999 charged out for depreciation, the amount earned on the stock for the year would be $583,423, or 4.32 per cent. on the $13,500,000 oustanding.

The price realized on fine copper per pound averaged 13 1-3 cents, and gold $20 per ounce.

The net cost per pound of copper, after deducting values of gold and silver, was 10.31 cents, the cost per ton of ore, including all expenses, was $3.486.

The enormous decline in the price of copper and the marked influence on the cost by reason of the difficulties with which the smelter had to contend, permitted the declaring of only two dividends, viz., one of 3 per cent. on September 30, 1907, and one of 2 per cent. on June 30, 1908.

The Kerr Lake Mining Company's output for the year was 1,473,712 ounces of silver with a gross value of $787,554. To date the company has produced silver to the value of $1,310,000.

The next 5 per cent. dividend on Silver Queen will be paid on November 15. This is the regular quarterly 3 per cent., plus a 2 per cent. bonus, which is now becoming regular.

We reprint here a statement issued by the Crown Reserve Mining Company:—

1. That we have since made another 30-ton shipment, which will net us at least $50,000.

2. That our ore on hand has increased to at least $150,000, a letter from the superintendent received this morning stating that the ore-house is literally blocked up with it.

3. That we will ship two cars of high-grade ore monthly after this month.

4. That all our buildings will be fully completed by the 1st of October next, and that the only accounts now unpaid are current monthly ones for this month.

5. This company is in no way interested in any law suit or litigation of any sort, our property being purchased direct from the Government of the Porvince of Ontario, and title guaranteed by special act of the Ontario Legislature.

6. Our property is easy of access to any shareholder, and is always open for their inspection. We have worked our property from the first day on a strictly business basis, ask no favors of anyone except to be allowed to mind our own business, and to be allowed the privilege of working our own property in the best interests of our shareholders.

JOHN CARSON, President.

Statement of Assets and Liabilities at August 31st, 1908.

Assets.

Mining property, mineral rights, buildings, plant and equipment	$2,030,495 69
Cash in banks and on hand	37,609 79
Ore on hand	100,000 00
Ore in transit	40,000 00
Due from smelters	39,551 84
Accounts receivable	500 00
	$2,248,157 32

Liabilities.

*Capital stock	$1,999,957 09
Accounts payable	19,319 31
Royalties due and accruing	27,968 11
Profits and Loss:	
Nine months to August 31, 1908....$271,665 45	
Less Dividend paid 2nd July, 1908... 70,752 56	
	200,912 90
	$2,248,157 32

*231,143 fully paid up shares of $1 each of the above amount are held by trustees for the benefit of the company.

Audited and verified,

P. S. ROSS & SONS,
Chartered Accountants.

Montreal, Sept. 8, 1908.

Dominion Coal Company, Ltd.

A quarterly dividend of one per cent. has been declared on the common stock of Dominion Coal Company, Limited, payable October 1st, 1908, to shareholders of record at the closing of the books on September 18th, 1908.

Transfer books of the common stock will be closed from September 18th, at 3 p.m., until October 1st, at 10 a.m.

STATISTICS AND RETURNS.

The output of the Crow's Nest Pass Coal Company's collieries for the week ending October 2nd was 9,286 tons, a daily average of 3,214 tons. For the week last year the output was 20,692 tons, a daily average of 3,448 tons.

The output of the Crow's Nest Collieries for the week ending October 9th was 17,463 tons, or a daily average of 2,910 tons.

DOMINION STEEL OUTPUT.

Dominion Steel's output for the month of September was below the August level. The figures:—

Pig iron	18,000
Ingots	16,000
Blooms	17,900
Rails	12,000
Rods	3,200

Shipments of ore and concentrates from the Cobalt camp in the month of September broke all records, totalling 3,120 tons. Shipments in the nine months of 1908 are nearly double those of the same period last year, totalling 16,337 tons against 9,766 in the first nine months of 1907. Shipments by months (in tons) were:—

	1907.	1908.	Inc.
January	980	1,325	345
February	903	1,173	270
March	1,027	1,832	805
April	533	1,317	784
May	1,158	1,601	443
June	1,939	1,581	*357
July	1,327	2,022	695
August	1,139	2,366	1,227
September	760	3,120	2,360
Totals	9,766	16,337	6,571

*Decrease.

NOVA SCOTIA STEEL FOR PAST EIGHT MONTHS.

The coal shipments of the Nova Scotia Steel and Coal Company for the eight months show an increase of 19,767 tons.

August, 1908	64,406
August, 1907	81,590
Decrease, 1908	17,184
August, 1907	81,590
Eight months, 1908	424,644
Eight months, 1907	404,877
Increase, 1908	19,767

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt, and those from January 1st to date:—

	Week end. Sept. 26. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	62,000	912,950
*Cobalt Central	60,000	102,975
Drummond	60,000	1,697,790
La Rose	146,410	6,117,252
McKinley	52,530	2,258,570
Nipissing	231,590	4,363,597
O'Brien	122,480	5,144,687
Right of Way	61,660	1,033,780
Silver Queen	249,000	1,372,990
Temiskaming	60,000	808,620
Temiskaming & Hudson Bay	60,000	1,220,500

*Concentrates.

The total shipments for the week were 1,155,670 pounds, or 578 tons. Total shipments from January 1st to date are 33,130,483 pounds, or 16,565 tons.

Following are the weekly shipments from Cobalt, and those from January 1st to date:—

	Week end. Oct. 3. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	912,950
**Coniagas	63,400	969,360
Cobalt Lake	.....	341,683
Crown Reserve	.....	242,000
*Cobalt Central	.....	402,975
Chambers-Ferland	61,800	183,450
City of Cobalt	191,600	1,197,220
Drummond	60,000	1,065,620
Foster	.....	297,300
Kerr Lake	.....	756,174
King Edward	.....	127,240
La Rose	253,390	6,370,642
McKinley	121,200	2,379,770
Nipissing	176,900	4,540,497
Nova Scotia	.....	392,275
Little Nipissing	.....	40,110
Nancy Helen	.....	367,427
O'Brien	127,700	5,272,387
Peterson Lake	.....	41,237
Right of Way	.....	1,033,780
Provincial	.....	143,210
Silver Leaf	.....	258,030
Silver Cliff	.....	52,000
Silver Queen	63,000	1,435,990
Townsite	40,000	251,700
Temiskaming	.....	808,620
Temiskaming & Hudson Bay	240,000	1,460,500
Trethewey	.....	1,910,476
Watts	.....	561,680

*Concentrates. **Concentrates and high-grade ore.

The total shipments for the week were 1,398,990 pounds, or 699 tons. Total shipments from Jan. 1 to date are 34,429,473 pounds, or 17,215 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, Sept. 26.—The following are the ore shipments from the mines of the various districts of Southeastern British Columbia for the past week and year to date:—

	Week.	Year.
Bundary	38,239	1,008,100
Rossland	5,478	203,699
East of Columbia River	1,845	73,135
Total	45,562	1,284,943

Following are the shipments from the various mines and receipts at smelters of the districts of Southeastern British Columbia for the week ending October 3, and the year to date:—

Boundary shipments—	Week.	Year.
Granby	21,681	786,852
Mother Lode	10,578	171,777
Oro Denoro	217	49,886
Snowshoe	2,249	9,124
Other mines	Nil	22,248
Total	34,778	1,039,877
Rossland shipments—		
Centre Star	4,051	127,258
Le Roi	2,049	59,631
Le Roi No. 2	344	22,225
Evening Star	58	865
Mayflower	16	31
Giant	5	5
Other mines	Nil	177
Total	6,523	210,015
East of Columbia River—		
St. Eugene	699	18,781
Whitewater	68	1,379
Whitewater milled	280	7,208
Queen milled	185	7,205
Poor Mal milled	250	8,300
North Star	47	3,135
Richmond	26	1,724
Bluebell	22	1,163
Arlington Erie	23	1,120
Rambler-Cariboo	21	930
Silver King	51	550
Idaho	57	419
Reco	21	314
Sunset	21	249
Keystone	20	70
Golden Giant	2	58
St. Eugene No. 2	24	24
Other mines	Nil	74,952
Total	1,817	74,952
Grand total	43,118	1,324,854
Smelter Receipts.		
Grand Forks	21,681	786,852
Greenwood	10,848	224,203
Boundary Falls	Nil	21,872
Trail	8,838	211,154
North Port (Le Roi)	2,272	65,114
Marysville	Nil	5,730
Total	43,639	1,314,925

MARKET REPORTS.

Oct. 8.—Connellsville coke, f.o.b., ovens—
Furnace coke, prompt, $1.50 to $1.60.
Foundry coke, prompt, $1.90 to $2.00.

Metals.

Oct. 8.—Tin, Straits, 29.6 cents.
Copper, prime Lake, 13.5 to 13.625 cents.
Lake arsenical brands, 13.5 to 13.625 cents.
Electrolytic copper, 13.45 to 13.55 cents.
Copper wire, 14.75 cents.
Lead, 4.475 cents.
Spelter, 4.775 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8 to 8.125 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $46 per 75 lb. flask.

SILVER PRICES.

	New York. Cents.	London Pence
September 26	51 1-2	23 3-4
" 28	51 5-8	23 13-16
" 29	51 5-8	23 7-8
" 30	51 3-4	23 7-8
October 1	51 5-8	23 15-16
" 2	51 1-2	23 3-4
" 3	51 3-8	23 13-16
" 5	51 7-8	23 15-16
" 6	51 3-4	23 7-8
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" 9	51 3-8	23 11-16

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660 Pembroke. 599 Timiskaming.

964 Geological Map of parts of Algoma and Thunder Bay. 8 m. = 1 in.
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For reports of the Bureau of Mines, maps, mining laws, etc., apply to

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The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

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The Mineral Province of Canada

has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

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The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

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The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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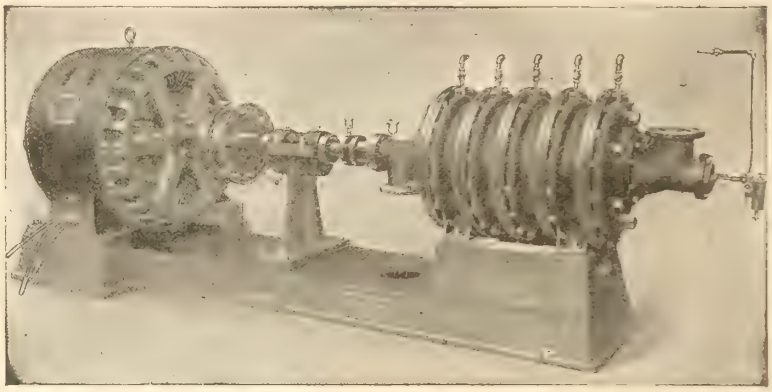
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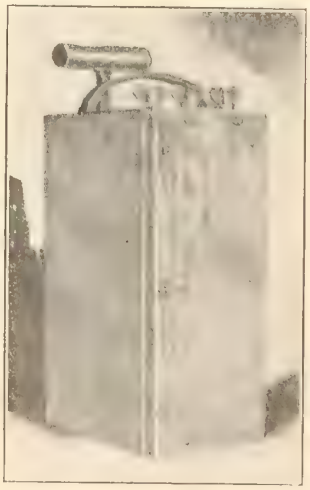
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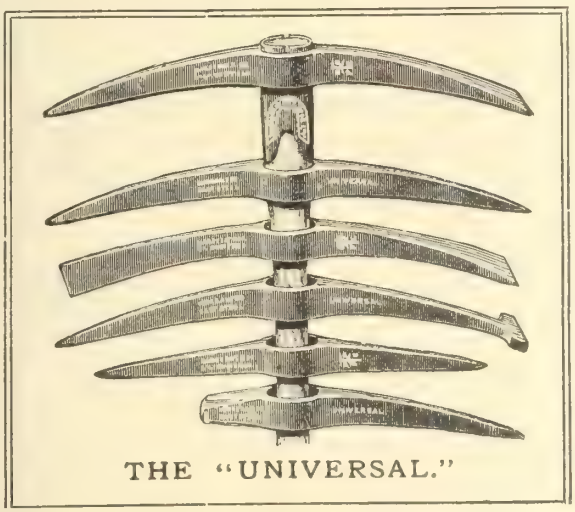
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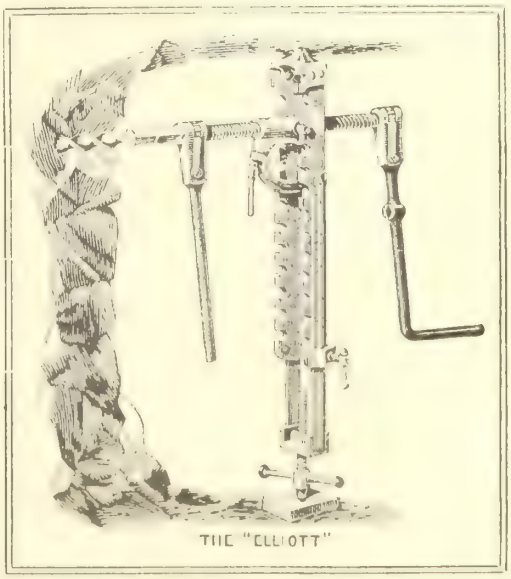
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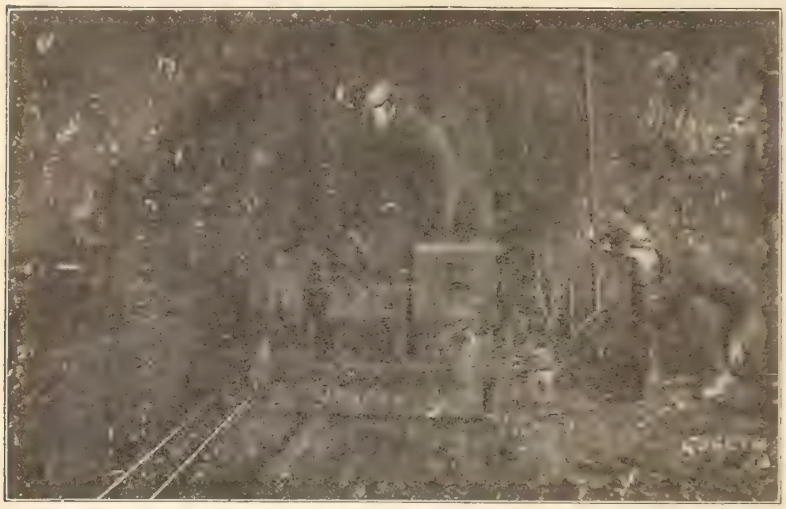


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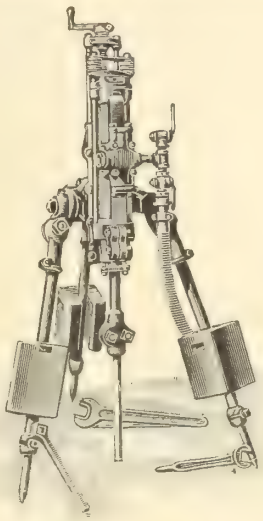
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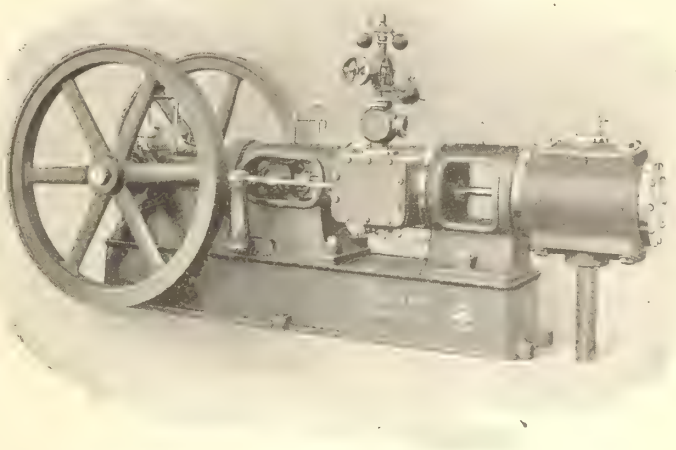
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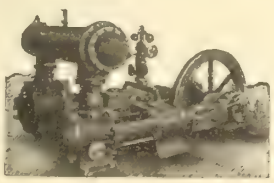
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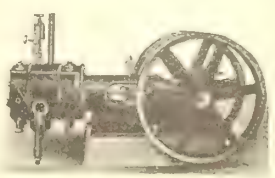
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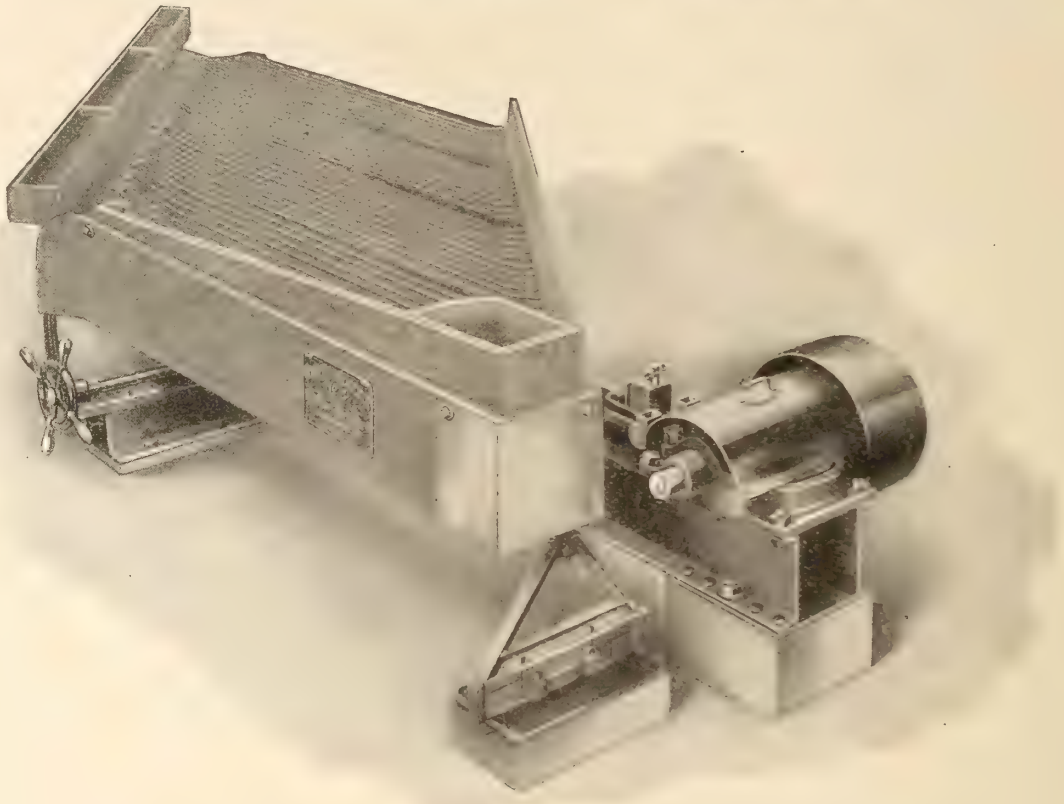
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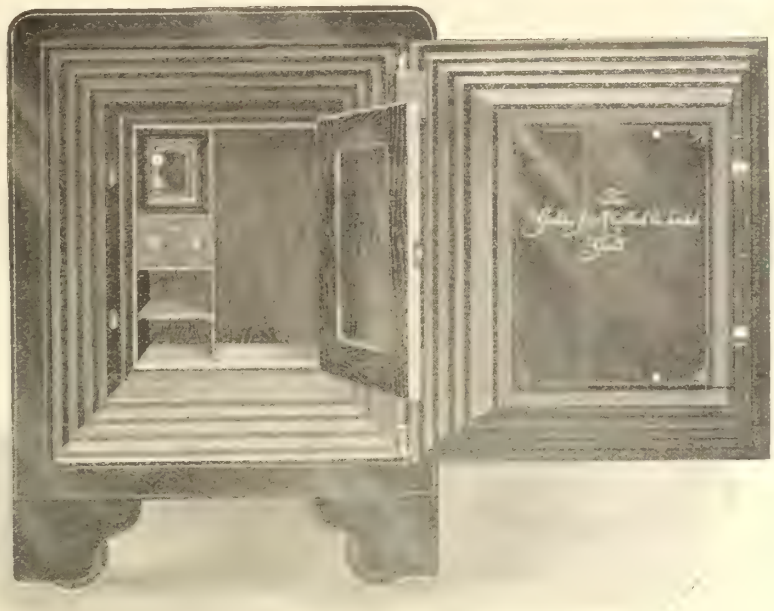


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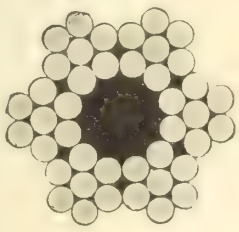
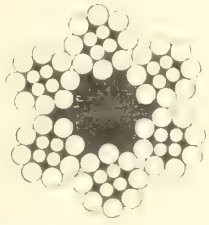
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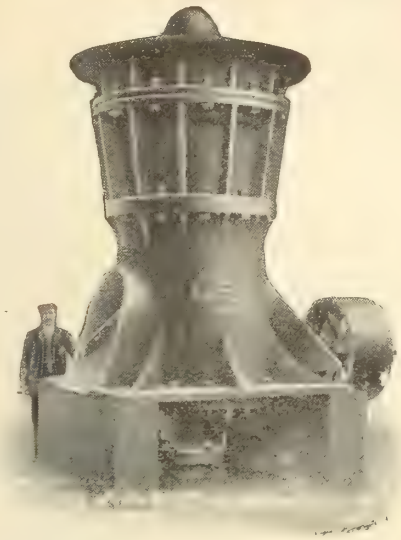
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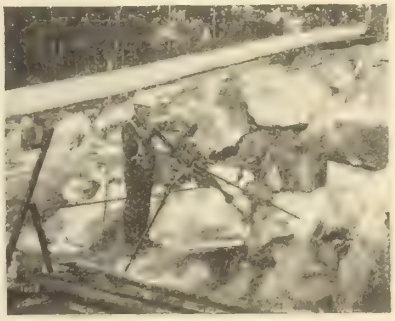
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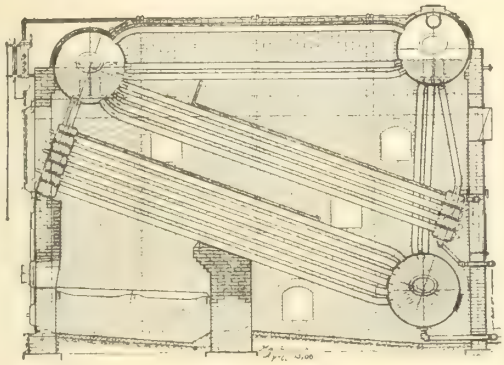
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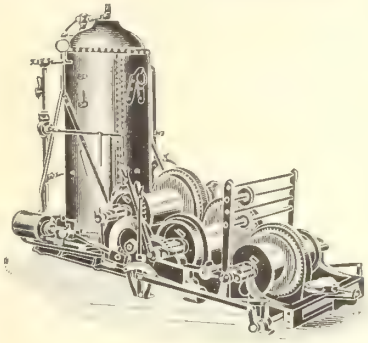
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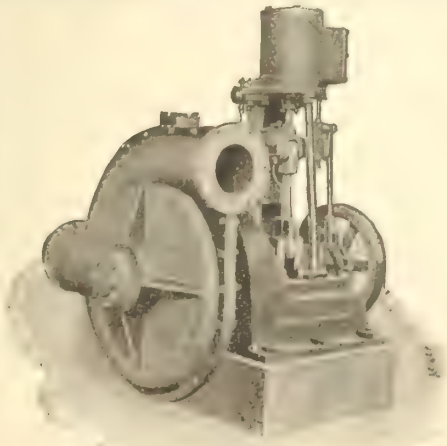
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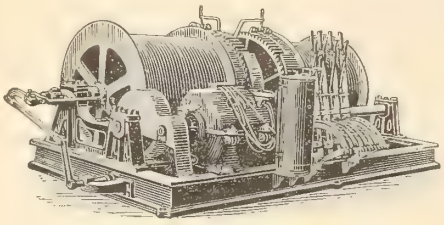
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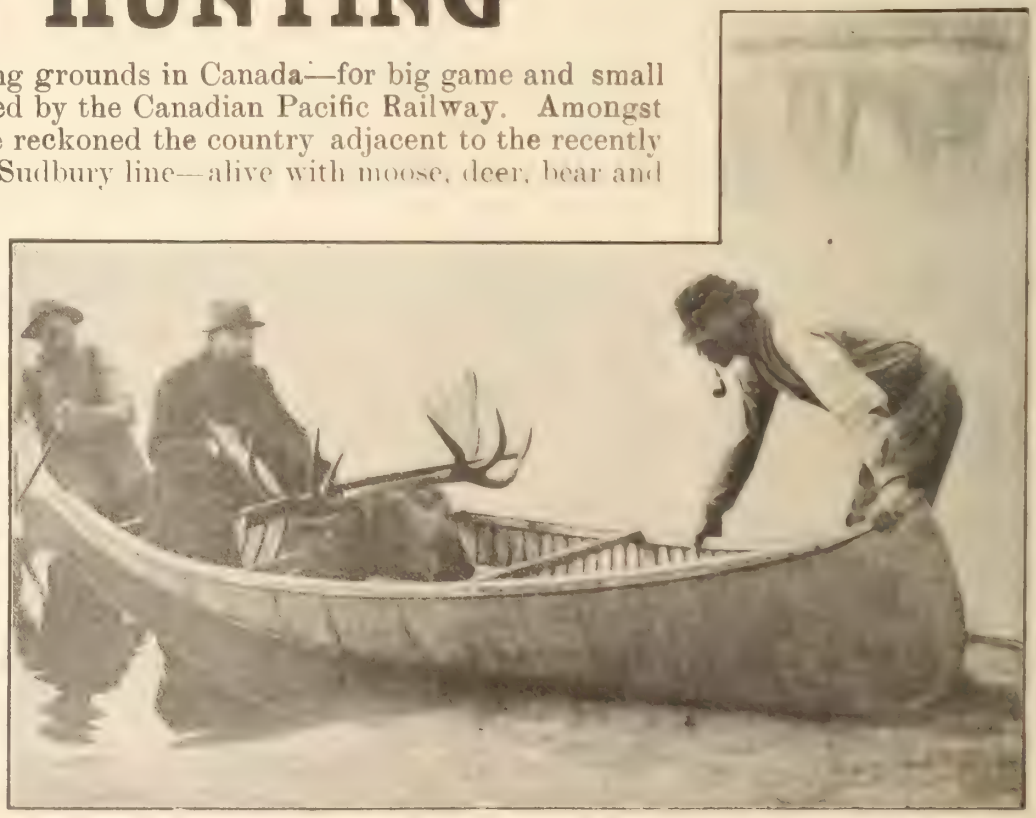
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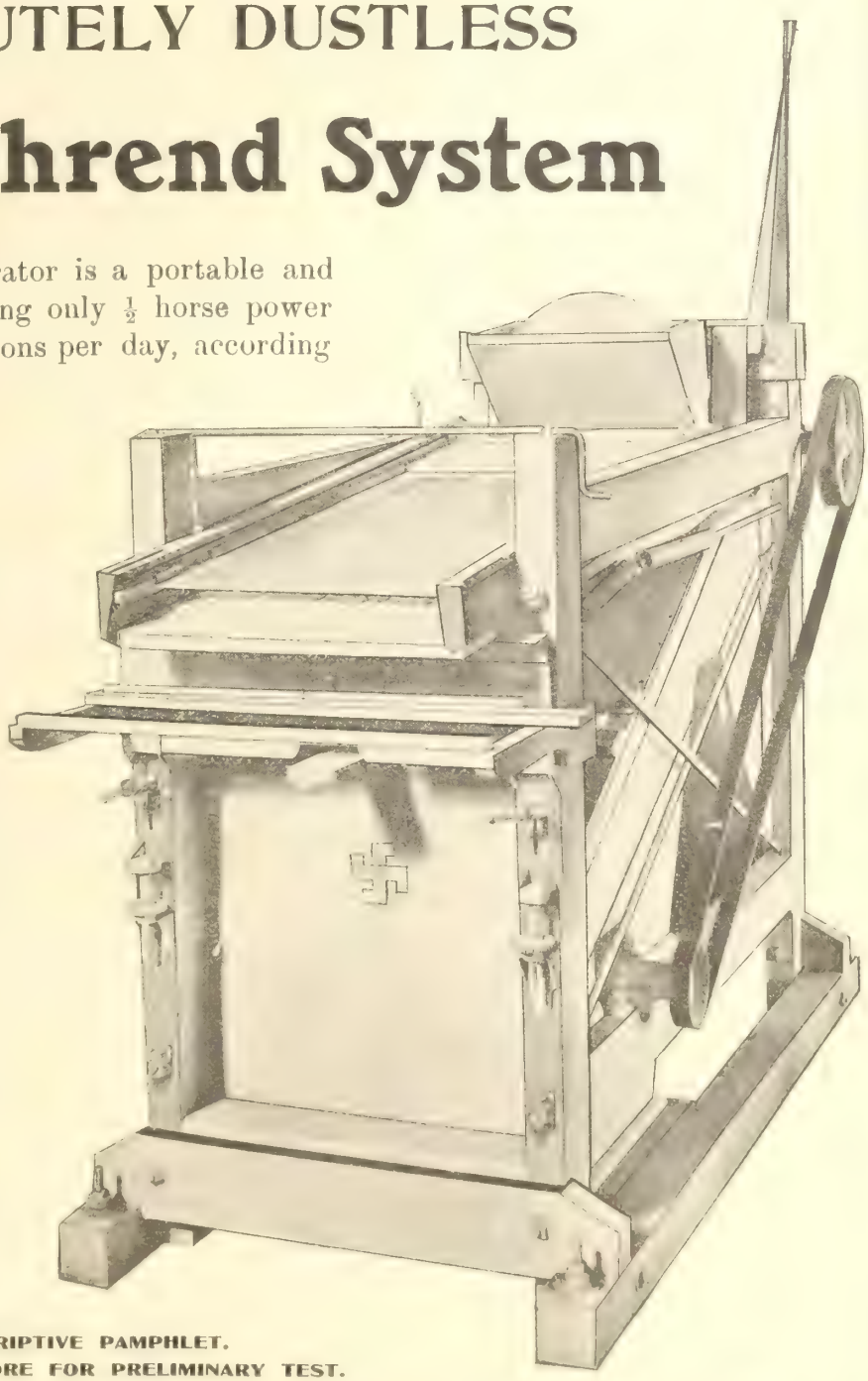
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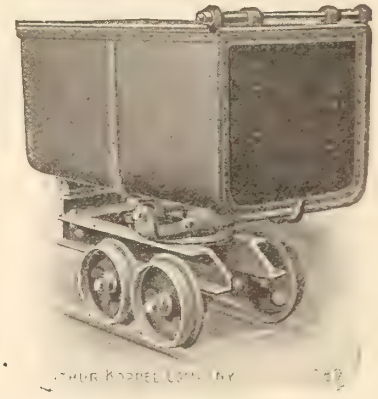
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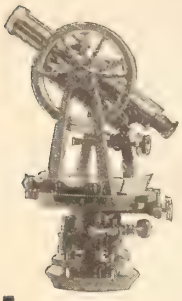
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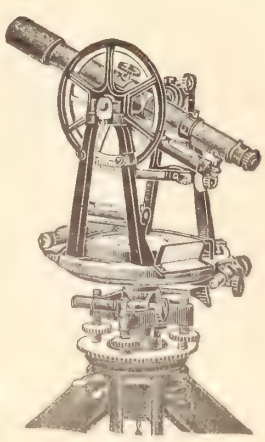
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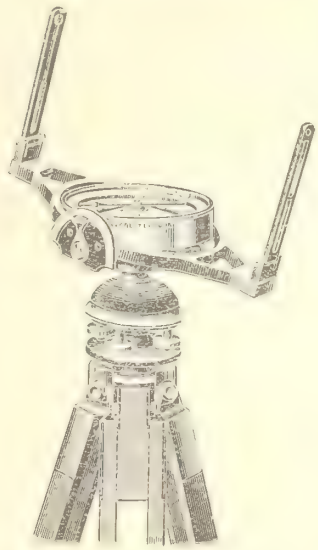
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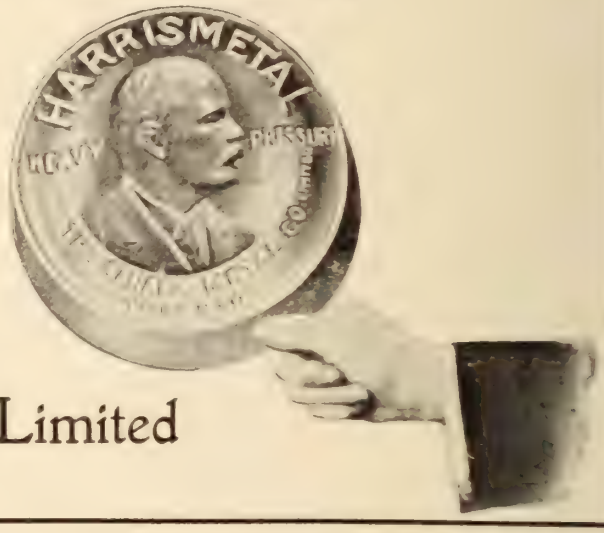
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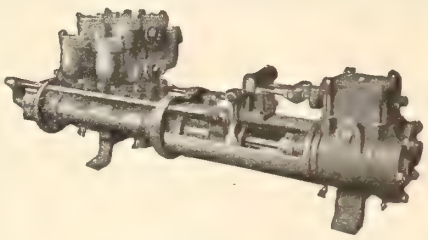
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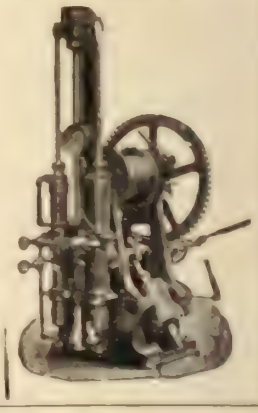
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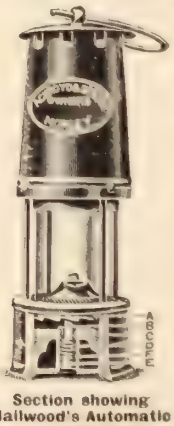
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO, November 1, 1908 No. 21

The Canadian Mining Journal

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CIRCULATION.

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STEEL AND COAL.

Some time ago we alluded to the lamentably personal tone of the quarrel between the Dominion Iron & Steel Company and the Dominion Coal Company. More recently we pointed out that the Dominion Coal Company, through its president, had made definite overtures in the direction of a peaceful settlement, and that these had been rejected by the Dominion Steel people with but scant show of courtesy. Not only was this the case, but, possibly with the object of displaying their entire confidence in an ultimate victory, the Dominion Steel directors have failed to put forward any adequate counter-offer.

As bearing upon one of the most important phases of the Dominion Steel Company's arguments, we recommend to our readers' attention the article in this number of the Canadian Mining Journal describing Dominion Colliery No. 6. Mr. Gray touches upon the "Phalen seam" controversy. Our readers may judge for themselves as to the conclusiveness of the facts as there adduced.

Instances such as the "Phalen seam" dispute, in the light of later developments, prove the unreason of all such costly lawsuits as that of Steel vs. Coal. Whether Dominion Coal or Dominion Steel was to blame originally is insignificant in comparison with the urgent question as to why the dispute was allowed such a protracted existence. The country at large has an indisputable right to demand an answer to this.

The moment that quarrels of this kind, involving directly and indirectly many millions of dollars, reach the courts and high-priced legal lights are engaged to fight the case out, an amicable and equitable settlement becomes almost impossible. It is our firm belief that such quarrels should be taken entirely out of the hands of hot-headed principals and referred at an early stage to a properly constituted Conciliation Board, a body analogous in most respects to that which deals with difficulties between employers and employed, but clothed with absolute power to give a final and binding decision. Had such a board been in existence Canada would have been spared two years of undignified bickering.

MODERN STAMP-MILLS.

A South African stamp-mill, which commenced crushing in September, is notable in several respects. The mill framework is constructed of steel. The battery is driven in units of five stamps by individual motors. There are 300 stamps. Each stamp weighs 1,750 pounds.

Steel construction for large stamp-mills is now an established practice. Self-contained units, in which

the cumbrous cam-shaft of the past is replaced by one that does duty only for five or ten stamps instead of twenty or thirty, are logical necessities. Repairs are lessened and lightened. A break-down involves only the unit concerned, and great flexibility is attained in large installations.

Not only do these changes facilitate the every-day running of the mill, but they also make the mine manager's work lighter. Parcels of ore from different parts of the mine can be treated separately without loss of time, and on all the ore crushed a closer watch can be kept. Incidentally also there is a great saving of power in any such system of controllable units.

MIND AND MATTER.

Secular education has made giant strides in latter years. The principles of evolution have been accepted by scientist and theologist alike, as the foundation of modern knowledge. Geology, chemistry, theology, have become but naked equations. The mighty groanings and laborings of Mother Earth have been measured, recorded, and analyzed. We know that certain climatic and certain physiographic environments produce Anabaptists, that others bring forth Mahometans. Here, the Heresy-trial will flourish; there, the Inquisition.

And so we are filled with conceit of ourselves. In our pride we forget that there be many things of which we have but dim knowledge.

All of which leads to the recital of a tale that is worth telling—a tale that proves that man in his direst need must depend not upon books or brains or muscle, but upon a psychic something that is latent in all of us, developed in but a chosen few.

Upon another page is recorded the progress of that flying squadron of excursionists, which, piloted by the Canadian Mining Institute, traversed so recently our fair Dominion. Mines, quarries, furnaces, they visited. With them went one free-born citizen of Cobalt.

At a town called Calgary an hospitable rancher seized upon the pilgrims and bore them to his ranch, where, for their edification, he had caused a bronchobusting, steer-lassooing tourney to be held. Now the tourney proper was confined to a large enclosure, whose limits were marked by a high barbed wire fence.

After due busting of bronchos the steer-lassooing began—also the trouble. The guests, men venturesome and intrepid in shaft or drift or smelter, were looking now upon strange doings. The danger of the unknown brought them together, and they congregated near the entrance of the corral.

Without a warning, like an overdue creditor, a steer wide of horn and unspeakably fierce of mien, eluding cowboys and busters, sought to do some busting on his own account. Then horrid was the sight. Bulky Teuton, stolid Briton, austere Austrian, surly Scot, impaled himself upon that barbed fence. But the Man from Cobalt, captain of his soul, master of his emotions, shinned a seven-foot fence post and gazed serene upon the tumult below. Not long was he serene. That steer, blood in his eye, slaughter in his wicked heart, charged. Blinded with blackest passion, he hurtled into—not foreign dignitaries and international complications—but into and through the barbed wire.

Now the perch of the Man from Cobalt was precarious at best. Good living had increased his diameter, widened his cross-section. Thus it befell that the impact of that impetuous steer upon the fence loosened our hero's hold and shook him, not unlike an overripe plum, to the ground. And now behold him, recumbent, dazed, helpless, facing the horn-tossing beast! Did the Man from Cobalt blench? Did he quail? Did an ague of fear seize him? Not so! Calmly, intently, he fixed that animal with his luminous eye. Slowly, but surely, under the mesmeric power of that eye, the steer became less hostile, and at last, resuming his neglected cud, turned and went his way.

Such is the simple narrative of one great victory. We feel a spiritual glow, a lofty joy, in the knowledge that Cobalt produced the victor.

THE HON. MR. TEMPLEMAN.

There are considerations that override all questions of politics. On one of these we wish to touch.

The Hon. William Templeman was Canada's first Minister of Mines. The Department of Mines, created a little more than a year ago, has already, under Mr. Templeman's direction, accomplished much. But more has been planned.

The Minister of Mines, accompanied by the Acting-Director of the Geological Survey, R. W. Brock, has recently completed a tour of inspection of Ontario and British Columbia mining districts. We have reason to believe that similar tours through Quebec, New Brunswick and Nova Scotia were to have been undertaken. This is but an incident. But it reveals the fact that the Hon. Mr. Templeman is keenly interested in the mining industry and is anxious to see things for himself. Moreover, the Hon. Mr. Templeman has won and held the confidence not only of the officers of his department but of Canadian mining men.

As a result of the election, Mr. Templeman is now without a seat in Parliament. We hope most sincerely that this will not mean that he will no longer serve as Minister of Mines. We are sure that the Premier is sufficiently cognizant of the need there is of honest, competent and enthusiastic work in directing a department whose importance is growing day by day. The Hon. Mr. Templeman's work speaks for itself. A break in its continuity would be particularly disastrous. Any step that will insure the return of the Hon. Mr. Templeman to the position of Minister of Mines will be heartily welcomed by the Canadian Mining Journal.

and, if we are not mistaken, by all Canadians interested in the development of the mineral industry.

TAXATION OF MINERAL RESOURCES

Discussion of this vexed subject usually results in dithyrambs or expletives. We recall vividly certain delegations that waited upon a provincial minister of mines; and we remember thinking of the story of the Tower of Babel as it is recorded in Holy Writ.

We are glad to present in this number of the Canadian Mining Journal, a vigorous and suggestive paper on the taxation of mineral resources. Mr. Skelton is not unknown to the reading public. As the successor of Professor Adam Shortt in the chair of political ecenomy at Queen's University, Mr. Skelton occupies a position of more than academic importance.

Mr. Skelton's views are set forth with freshness and force. His subject is complicated and difficult. But he has wisely attempted to get down to bedrock, to make sure of whatever foundation there may be. In this respect he has rendered valuable service by clearing away incidental and accidental material that heretofore has blocked the view of those most interested in the subject.

It is beyond contradiction that Canadian mining men have either given the question of mine taxation too little consideration or have allowed purely local conditions to color their opinions too strongly. The matter is one that demands broad and careful treatment. Above all it is necessary that the recommendations made in the name of our representative society, the Canadian Mining Institute, be made not in the heat of debate, but only after lengthy deliberation.

We hope that Mr. Skelton's excellent paper will arouse renewed interest in a topic that should not be permitted to grow stale.

COAL DUST EXPLOSIONS.

The conclusions adduced by Messrs. James and John Ashworth in their paper on coal dust explosions are particularly important.

For some time watering was advocated as a panacea for all coal-dust ills. It was recognized, however, that where the mine temperatures were high, watering rendered work impossible. Next it was established that, in the presence of coal-dust, a damp atmosphere is more dangerous than a dry atmosphere.

Moreover, the best of flameless explosives may become the immediate cause of coal-dust explosions. The Messrs. Ashworth have ample ground for their dictum "that it is not possible to use any known explosive with absolute safety in a gaseous mine."

Here, however, the use of minimum quantities of explosion for each shot fired offsets the danger.

These, and many other considerations, point to the necessity of close and complete investigation of all the phenomena attending coal-dust explosions. And the most intelligent method of attacking the subject is, we think, that of beginning at coal-dust itself. That coal-dust must be considered as made up of particles enveloped and saturated with gases, is a much more logical position than that which defines coal dust as a aggregation of small solid particles.

We are in hearty accord with the object of the Messrs. Ashworth's paper. It is intended as an outline of the problem from a practical, working point of view. It presents the subject in a manner calculated to inspire interest and provoke discussion. And free discussion will most effectually dispose of the mischievous fallacies that have heretofore hindered investigators.

A writer in Queen's Quarterly makes unkindly comments upon Mr. T. A. Rickard's book, "A Guide to Technical Writing." The critic's objections are numerous. He states that the book will never serve as a text-book on "composition even among science students. . . . It deals too much with details." The Quarterly critic is at sea. "Composition," as it is learned from text-books and as it is taught in public schools, is a ghastly thing. Mr. Rickard's book is valuable because it is interesting from cover to cover, and because it deals with details.

THE TAXATION OF MINERAL RESOURCES IN CANADA

By O. D. Skelton, Queen's University.

(Read before the International Tax Conference, Toronto, October 8th, 1908.)

The taxation of mineral resources is, from the nature of its object, of less universal appeal than any other phases of the fiscal question. Everywhere men own houses and lands, mortgage property, and bequeath estates. But it is in only a minority of the commonwealths on this continent that the posession of rich mineral deposits affords the budgetmaker an opportunity and a problem.

On this side of the line at least there is general agreement that the opportunity should be improved, and the mineral wealth of the nation be made in some form or other to pay toll to the treasury. A plausible case has been made out for state ownership and operation, especially in the case of coal mines, but such a proposal involves a further advance toward paternalism than our American conditions and requirements warrant, at least as a general policy. A recognition of the inexpediency of public ownership does not, however, necessarily entail the adoption of the policy of granting mineral lands in fee simple on nominal terms. The considera-

tions which have made it seem advisable, throughout the greater part of the continent, to grant agricultural lands outright to the settler, practically without payment, do not bulk so important in the case of mineral lands. Granting leases for a fixed term of years in return for rental or royalty payments, is an intermediate policy which has much in its favor, and is, in fact, the policy prevailing in some of the most important Canadian fields. If again we reject this compromise as not sufficiently attractive to the prospector and the promoter, and hand over the mineral heritage of the commonwealth to individual exploitation, there certainly remains a good prima facie case for demanding a share through the ordinary channels of taxation. Granting that mining is a lottery in which the prizes rarely reach the price of the tickets, there seems no valid reason why the prize winners should not contribute their quota to meet the needs of government, subject, of course, to the same qualification as in other lines—that the tax should not be so excessive and indiscriminate as to deter investment nor the mode of collection vexatiously hampering. Nor is there much disagreement that mineral resources should be reserved for state rather than for local taxation. Whatever abstract basis of taxation we choose, whether domain-right or benefit or the good old Jack Sheppard basis of faculty, it is manifest that the wider unit has the greater claim. Decisive in the same direction is the consideration that if an adequate tax were imposed by a municipality it would often far exceed its legitimate needs, and if, on the other hand, the tax were cut to suit the municipality's normal expenditure, the industry would escape paying its fair toll. More contentious and of more practical importance are the questions how, and how much, to tax. With the purpose of setting forth Canada's contributions to these problems I shall review briefly the measures adopted in the sections where mineral taxation provides an important part of the revenue.

To begin with the province in which we are assembled—Ontario. As you are doubtless aware, the sources of provincial and local revenue are in the main quite distinct in Canada, unlike in the United States. Ontario derives its revenue chiefly from a Federal subsidy granted in lieu of the customs revenue surrendered at Confederation, from succession duties, corporation taxes and licenses, and from timber dues, and mining taxes, sales, and fees. The existing mining policy is of very recent origin, coincident, in fact, with the Cobalt boom. Twice in the history of the province the growing prosperity of the mining industry has led to the imposition of taxation, and twice repeal has followed on its decline. So recently as 1900 the late Provincial Government decided to grant mineral lands in fee simple, free from all reservations, and abolished the existing royalties, which varied from 2 to 3 per cent. In 1906, when the Mines Act was revised, the present Government confirmed this action, on its negative side, taking the ground that the impairment of title involved in the lease-royalty system deterred investment. But there was no intention on the part of either the Government or the people, dazzled by the new-found wealth of Cobalt, of foregoing such a promising source of revenue; it was only desired to change the form of sharing. The popular demand for action was the more insistent because it was through the building of a Government railroad that the silver field had been discovered, and largely by the aid of Government officials that it was developed. The further fact that the indirect benefits received were less than usual, owing to the cost of working, the Cobalt deposits being extremely low, and the ore being nearly all shipped out of the country for treatment, made the case overwhelming. It was largely, it is to be noted in passing, the Cobalt and Copper Cliff properties that apparently were in mind when the tax measures were framed, a fact not without significance for other less spectacular, struggling branches of Ontario's mining industry.

Action took several different lines. Most radical was the determination to reserve and develop for the province a promising tract, containing three and one-half square miles, in the Gillies limit, which had been withheld from prospecting on account of the timber operations on the surface. The provincial mine is being developed in the most scientific manner, and it is hoped that the only Government-owned and operated mine on the continent will prove a large source of revenue. Ontario has shared in the wave of public ownership sentiment, which has steadily been rising in America for the past few years, so that this step met with almost unanimous approval: public ownership has a romantic glamor when it is a silver mine which we, the people, control, lacking when the more prosaic gasworks or street-car line is concerned.

In various other cases where veins were found on the right of way of the Government railway, or where claims were in litigation, special bargains were made on the basis of a cash bonus, together with a royalty of varying amounts. The bed of Cobalt Lake was sold for $1,085,000, of Kerr Lake for $178,500, and a royalty of 10 per cent.; the O'Brien and Crown Reserve pay a royalty of 25 per cent., while the Government railway, the Temiskaming and Northern Ontario, has made similar royalty agreements, usually on a 25 per cent. basis, with companies controlling the City of Cobalt, Cobalt Townsite, and Right of Way. These royalties, it is to be remembered, are not instances of a general scheme of taxation, but merely portions of the purchase price of claims sold under exceptional circumstances. Over and above the royalties paid, these mines are subject to the general tax about to be noticed.

Taxation proper forms the third source of mining revenue in Ontario. The basis laid down in the Act of 1907 is net profits. All mines which yield an annual profit above the exempted amount of $10,000 pay a flat rate of 3 per cent. on such excess. In ascertaining the profits, the gross receipts, or value at the pit mouth, is taken, and from this sum is deducted the cost of transportation of output sold, if borne by shipper, and actual working expenses, including mine wages and salaries, cost of fuel, of explosives, power, insurance, and sinking new shafts, and an allowance for depreciation of the plant—not of the mine. The tax levied in any year is based on the profits of the preceding year. Detailed statements are required for every operator, subject to check by the Mine Assessor, who is vested with wide powers of investigating both mine and books. Provision is made for appeal against the assessment of the Bureau of Mines to the Ontario Railway and Municipal Board, or to the Mining Commissioner, and if more than $1,000 is involved, a final appeal may be taken to the Ontario Court of Appeal.

Natural gas is taxed two cents per 1,000 feet, based on the company's books, or, if the Mine Assessor considers it advisable, on meter records. This, however, is virtually an export tax, as 90 per cent. of the tax is remitted if the gas is consumed in Canada, while gas used by municipalities is entirely exempt. Similarily in

the case of iron ore smelted in Canada, the profits tax is entirely remitted. In addition, an acreage tax of two cents per acre is imposed on all mining claims in unorganized portions of the province, above ten acres in extent, including mining rights held separately from surface rights. The final source of income consists of fees for prospectors' licenses, claim-staking, recording and transferring claims, etc. Mining companies, as well as individuals, are required to hold a miner's license, the fee varying with the amount of capital stock, but not exceeding $100.00 per million of capitalization.

It may be interesting to sum up the provincial revenue from mining sources in 1907; it comprised:—

Sales of mining lands		$1,184,719 06
Leases		21,563 16
Miners' licenses, recording fees, &c		272,937 13
Royalties		207,945 06
Supplementary Revenue Act, 1907.		
Taxes on natural gas	$11,527 47	
Taxes on profits	26,922 00	
Acreage tax	5,003 88	
		$43,433 35
Assay Office (Belleville)		1,642 96
Total		$1,731,720 72

It should be noted that this was an exceptionally heavy year. The largest item, sales of mining lands, includes over a million dollars on the Kerr Lake and Cobalt accounts, and is not likely to be duplicated. On the other hand, the taxes under the Supplementary Revenue Act are based on the 1906 production, and will be much larger in succeeding years.

A word or two on the relations between provincial and local taxation. The Ontario Assessment Act provides that municipalities shall assess mineral lands, except oil lands, only at the value of other lands in the neighborhood for agricultural purposes; plant and equipment may be assessed at full value. Income derived from mining properties is, however, subject to municipal taxation in the same manner as other incomes. Contrariwise, in assessing the profits tax to be paid to the province, permission is given to deduct income tax paid municipalities, if not exceeding one-third, or in one specific instance, one-half, the total due.

The systems of taxation prevailing on the other districts must be summarized more briefly. Quebec and New Brunswick have rich mineral resources, but in neither case has development, especially of metallic minerals, proceeded far enough to warrant extensive taxation. Nova Scotia, however, possesses thriving coal and gypsum industries, a declining gold industry, and a subsidized iron industry. Mining taxation is an important source of its revenue, providing over 40 per cent. of the provincial income. Nova Scotia still adheres to its traditional policy of granting only leases of its mining lands, deriving a revenue chiefly from rentals and royalties. On gold a royalty of 2 per cent. of the gross value of the output is levied, collected from the stamp mills. The rental and royalty on gold amounted last year to about $13,000. Of much greater importance is the coal royalty, 10 cents a ton, excepting in the case of the Dominion Coal Company, which in 1893 obtained a 99-year lease of about 150 square miles on a 12-cent royalty basis. The royalty collected last year on a production of 5,700,000 tons was $563,000, or about 5 per cent. of the gross value of the output. Other license and rental fees brought the total to $633,000.

At the other side of the continent British Columbia contests with Ontario for primacy in mineral production, chiefly gold, silver, lead, copper and coal. The same policy prevails in granting lands in fee simple. The western province has not sought to swell its revenue by developing provincial mines or making million-dollar sales, but its system of taxation is comprehensive and well devised. A general tax is levied on minerals, other than coal, 2 per cent. of the gross, not the net, value of the output; ore-producing mines yielding less than $5,000 a year are granted a refund of half the tax, while the placer mines yielding lass than $2,000 are exempt entirely. On coal there is a tax of ten cents per ton, and fifteen cents on coke, if produced from untaxed coal. Until last year the rates were five and nine cents respectively. Unworked coal lands are taxed 2 per cent. on the assessed value, and an acreage tax of 25 cents per acre is imposed on unworked Crown-granted mineral claims. These taxes, together with the usual fees, brought in over $580,000 last year out of a total provincial revenue of $4,440,000.

The Federal Government also receives a share of mineral taxation. In the Provinces of Alberta and Saskatchewan, where the Dominion retains the Crown lands, a royalty of five cents per ton is collected on the coal, which, especially in Alberta, is being mined in rapidly growing quantities. The Yukon, which, as a territory, is still under Federal control, also yields a fair return to the Dominion. While its bonanza days are over and the production of gold has dwindled from $22,000,000 in 1900 to one-fourth of that sum last year, there is still good prospects of work on large scale, in dredging and quartz mining. The rate of taxation levied by the Dominion has decreased about as rapidly as the production. In 1897, to recoup itself for the heavy expenditure for road-building and policing caused by the Klondike rush, the Government imposed a tax of 10 per cent. on the gross value of the output up to $500, and above that 20 per cent. In the spring of 1898 the tax was made uniform at 10 per cent., with an exemption fixed at $2,500. As the levy was based largely on voluntary returns, it is no wonder that the high rate of taxation prevailing there was much evasion. In the year 1900, for example, the production was $22,375,000, according to the figures of the Bureau of Mines, based largely on reports of the Seattle and San Francisco assay offices. Yet the royalty collected for the fiscal year of 1899-1900 was only $730,000. If one-third the total output were conceded to fall under the $2,500 exemption, the royalty collected should have been fully twice as great. Accordingly, in April, 1901, the rate was halved and the exemption doubled, and finally in May, 1902, the present system was adopted. A tax of 2½ per cent. is now levied on all gold shipped out of the territory, the exemption, of course, being abolished. The practice is to sell the gold to one of the banks and trading companies at Dawson for drafts on other Canadian or American cities. The bank, which has deducted the amount of the tax from the purchase price, pays the export tax on shipping out the gold. Close inspection is made at the boundary to prevent smuggling out uncertificated gold. The new system has proved much more satisfactory in operation.

Some brief comments on the legislation reviewed may be in order. It will be noted that in practically all cases the tax is based on the value of the product rather than on the capital value of the mine. In the "Outline of a

Model System of State and Local Taxation," presented to the conference last year by the Vice-President of this Association, it was recommended that mineral taxation "should be imposed wherever possible, upon the capital value, excluding the value of the surface. If for any reason this is not practicable, the tax can be imposed in the form of a royalty." In Canada the order of preference is just the reverse. The negative reason for this is found in the fact that our constitution leaves more scope for legislative discretion than the American State constitutions. As our cabinet system of government makes it possible to fix responsibility more definitely, we feel free to grant power more freely, assured that all will be well, so long as, in Palmerston's phrase, there is someone to hang. This results sometimes in short cuts to justice, as, for example, in the Ontario Government's handling of various Cobalt disputes, which would send a shudder through the American trained in awe of rigid constitutions and courts committed to outworn economic shibboleths. In the field of taxation this freedom means that the Legislature is not forced either to conform to constitutional limitations in the vain striving after the uniformity of the general property tax, as in Minnesota, or to evade them by having recourse to license or franchise taxes, as advocated in West Virgiain.

The positive reason for preferring a tax on output is its greater certainty and definiteness. Any estimate of the value of minerals still in the ground, such as that just completed by the Minnesota Tax Commission, must, it is felt, contain a large element of guesswork, diligent and scientific guesswork it may be, but guesswork still. Greater exactness may be imparted to such ad valorem estimates by taking account, among other data, of the annual output, net or gross, and capitalizing this amount; but it is evident that this is so far merely an indirect return to the annual product basis.

The Canadian provinces have been less unanimous in deciding whether to tax on gross or on net annual production, as the outline given has shown. There are obvious objections to taxing net profits. From the point of view of the taxing authority, the first objection is that if in any year there chances to be no net profit, the mine or industry in question escapes taxation entirely, a privilege not open to the farmer whose crop has failed or the merchant whose trade has been dull. This is a real difficulty, but its importance is less in mining than in railroading, for example, since the mine is less likely to be operated than the railroad when expenses cease to be met. The second objection, from the same viewpoint, is the danger of the books being doctored to make the net returns appear as small as possible. This, again, is a very real difficulty. It can be met, however, by the adoption of a uniform system of accounting. If some such system as that which the British Institute of Mining and Metallurgy is endeavoring to draw up were made compulsory, the Mine Assessor's task would be lightened. From the point of view of the industry taxed, objection is raised against the inquisitorial powers conferred on the Mine Assessor, with all their possibilities of abuse. On this point some light may be thrown by the following quotation from a letter from one of the most prominent mining men of the province: "One can easily see how the net profits tax gives opportunity for any amount of graft and fraud on the part of the Assessor, an opportunity for first knowledge of the financial positon of the different properties, and of working the stock market to his advantage accordingly. As a matter of fact, however, owing solely to the high character and efficiency of the present Mine Assessor, who happens to be so fair-minded and honorable a gentleman that he has met with the approval of the great majority of the mining men, the enforcement of the machinery for collecting the tax, has not, I think, proved unbearable." If then, by a satisfactory solution of the personal equation, and the adoption of uniform accounting, the main objections to the net profits tax can be overcome, it seems on the whole preferable to the tax on gross value, because of its greater fairness in allowing for differences in expense of working, between one mine and another. The British Columbia mineral tax on net smelter returns, which does not make such allowance, obviously bears hard on low grade properties, while its coal tax is a more serious burden on Rocky Mountain than on tide water producers.

Much less deserving of consideration than the men engaged in actual development are the speculator who hold claims undeveloped for decades, and the syndicate which blankets large areas to prevent competition. The extent of this problem is evidenced by the fact that while, in 1906, 1,300,000 acres of mineral lands had been patented in Ontario, only a small fraction was being worked. Quebec's mining development has been hindered even more by similar conditions. The problem is one which would not arise in serious form if the policy of granting only leases of mining lands were followed, a policy which, as in the case of timber lands, though, of course, to a less degree, seems essential to the conservation of the future interests of the country. Though it is objected that the leasing policy discourages investment, it would appear that a 20 or 30-year lease on a fixed rental and royalty would be as attractive to the actual operators, if not to the promoters, as an outright grant subject to variations in the tax-rate every two or three years. If, however, the fee simple policy is adopted, taxation should be called in to remedy the inevitable evils. Ontario and British Columbia have grappled with the problem their generosity created, by imposing an acreage tax. As a result of the stricter execution of the Ontario law in 1906, over 300,000 acres were forfeited for failure to pay the tax of one cent per acre then imposed. It is the opinion of many mining men that the acreage tax should be very materialy increased. Perhaps the best plan would be to impose a graduated scale, the tax being made light for the first few years after acquisition, and bearing more and more heavily each year thereafter, till a maximum was reached, so that the holders would be compelled either to develop the property themselves or to make way for someone who would.

One remove further still from the man with the drill and concentrator is the promoter who never produces anything but beautifully engraved certificates. It is a frequent and natural cause of complaint of mine operators that while they are rewarded for developing the country's resources by heavy taxation, the shady promotor goes scot free. It does not, however, seem advisable to attempt to remedy the evils of fraudulent promotion by the slow-moving and indiscriminate machinery of taxation. Hope is to be found rather in strict enforcement of the provisions of the Companies' Act regarding prospectus publicity and directors' liability, and in journalistic vigilance.

A question of minor interest is raised by the exemption granted oil wells in Ontario's scheme of taxation

In favor of exemption it is urged that by permitting municipalities to tax oil lands at their real, instead of at their agricultural, value, the gap is closed. But, aside from the fact that the municipalities do not, as a matter of fact, tax this increased value, the argument advanced runs counter to the general policy of separating provincial and local sources, which is one of the best features in the Ontario system. Nor does the plea that oil is a necessity in every home and therefore merits exemption, carry conviction on this continent dedicated to protective duties on the chief necessities of life. Perhaps the omission may be justified on the principle *De minimis non curat lex,* as the total production for 1907 was less than 800,000 barrels, worth about $1,500,000 (natural gas reached about $750,000 in value), and the grade is so inferior that the Dominion Government considers it necessary to give a bonus of 52½c. per barrel to enable the industry to compete with the American product. Possibly if a provincial tax were imposed the Dominion authorities might be obliging enough to increase the bonus correspondingly.

Though somewhat of a digression from the subject of the paper, it may be worth noting here, as the reverse side of the picture just presented, of abundant inflow of revenue, the amount expended on bonusing mineral production. The total revenue received in Canada from mining sources in 1905-06 was slightly under $2,000,000. In approximately the same fiscal year the Dominion Government paid out in bounties to encourage the production of lead, petroleum and pig iron, and the manufacture of steel and steel products, over $2,380,000. Various minor provincial subsidies and exemptions, not to mention very low rates granted certain steel companies, on the Government railroad, the Intercolonial, brought the amount well over $2,500,00. It is not to the point here to consider how far these subsidies have served their purpose or how far they have simply given company promoters more excuse for watering stock, but you can see from this brief reference how fond we are in Canada of taxing Peter to bonus Paul.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

F. W. GRAY.

(*Continued from issue of August 15.*)

Dominion No. 6 Colliery.

No. 6 Colliery is the most recent of the six Phalen seam mines of the Dominion Coal Company. It is a slope mine placed at the eastern extremity of the Glace Bay Basin, and its territory is mostly submarine.

The crop was opened in the spring of 1904, and the mine began to be a regular producer about one year later. At the present time the output is 25,000 tons per month, which will be raised to 30,000 in 1909, at which time the new permanent haulage now in course of construction will be completed.

No. 6 Colliery came into a good deal of prominence at the time of the Steel-Coal trial before Judge Longley



No. 6 Colliery Bankhead and Compressor House.

in Sydney. One of the most surprising features of this trial was the extraordinary assertion of the Steel Company's counsel that the workings of No. 6 Colliery were not on the Phalen seam. For several days in succession the court at Sydney was treated to learned disquisitions on paleontology and goelogical horizons, illustrated by a large wooden model of the Glace Bay coalfield. To those who had any knowledge of the actual facts the evidence given on this matter was a delicious admixture of opera bouffe and burlesque, to which the innocent seriousness of the performers gave additional piquancy. To disprove the Steel Company's contention the Coal Company were put to the expense of sinking boreholes all along the shore line from Caledonia Colliery to No. 6 Colliery. The explorations resulted in a complete and absolute corroboration of the plans and sections of the Geological Survey of 1872-1874, establishing the fact that the workings of No. 6 Colliery are on the continuation of the Phalen seam. This should never have been questioned. Only the audacity of ignorance could excuse a contention so



No. 6 Bankhead, Trestle Approach, Carry[illegible]

manifestly "frivolous and vexatious," and for ignorance, in view of the work of the Geological Survey, there was neither necessity nor palliation. This is very plainly shown by the remarks of Mr. Hugh Fletcher in his "Summary Report for 1907 on Explorations in Nova Scotia." Mr. Fletcher writes: "A few days spent in examining pits and boreholes between Glace

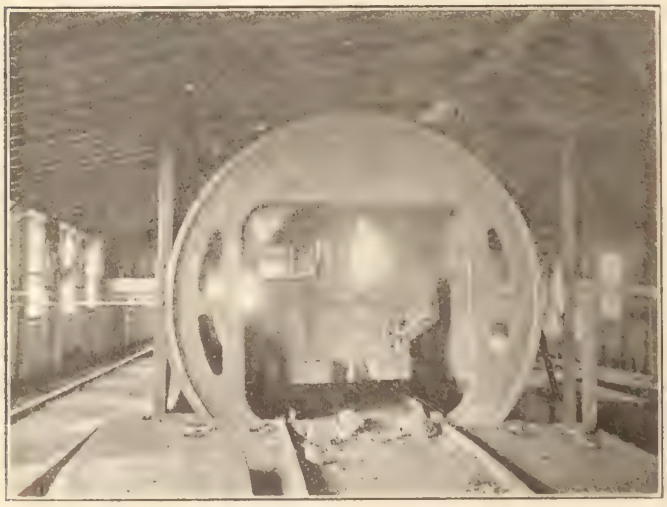
Bay and Schooner Pond convinced the writer that no mistake had been made in locating No. 6 as a colliery to supply the demand for Phalen seam coal, that the seam worked at No. 6 could be none other than the coal of the Clyde Mines and of McDonald Cove, called the Phalen; that the Emery seam is everywhere at its proper distance beneath it, and that, therefore, No. 6 cannot be on the Emery seam as had been suggested." After reviewing the evidence he had gathered in support of this statement Mr. Fletcher goes on to say that "it is not surprising that the writer should advise the Dominion Coal Company to desist from further explorations. My conclusions, which agreed with those communicated to the Dominion Iron & Steel Company in January, after consideration of all the official evidence on the subject, were again presented to the Dominion Coal Company." It will be remembered that the date of the Steel-Coal trial was August, 1907. In view of the fact that Mr. Fletcher's studied conclusions were placed before the officers of the Steel Company in January of the same year, comment is surely superfluous.

The surface buildings of the colliery and its equipment generally are of the most modern and substantial character, and provision has been made throughout for additions to the plant as the requirements of the colliery grow.

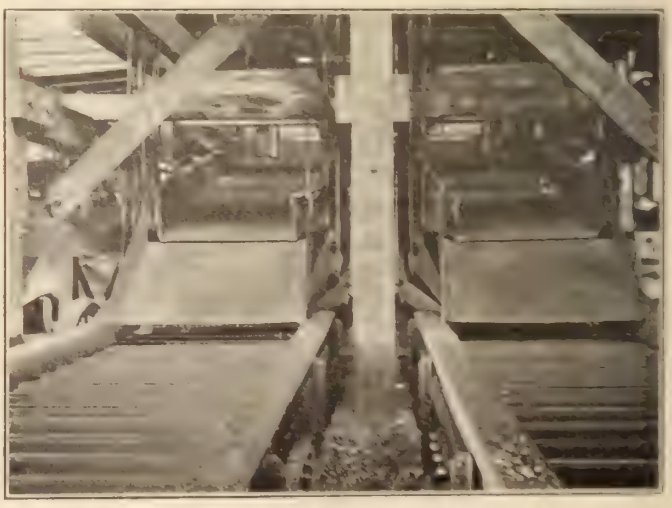


No. 6 Colliery—Interior of Compressor House.

The power plant at the present time consists of six Babcock & Wilcox boilers, rated at 1,500 hp., fitted with Parsons forced draft. The smokestack was built by the Alphonse Custodis Company of New York. It is 150 feet high, built of radial brick, on a common brick base. The boiler-house is of steel and brick con-



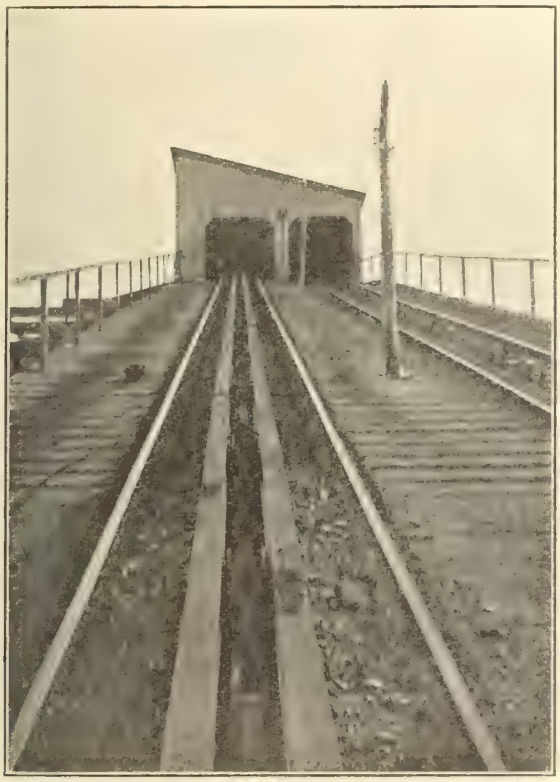
No. 6 Bankhead—Rotary Tipple.



No. 6 Bankhead—Picking Belts (Showing Screens)

struction, temporarily boarded up at one end to permit of a future extension of the boiler plant. An annex to the boiler-house contains the feed water heaters and feed pumps.

The compressor-house is a fine building, also of steel frame and brick construction. It is 90 feet



No. 6 Bankhead- Up and Down Car Hauls.

long, 63 feet wide and 30 feet high. It has massive concrete foundations, and is exceptionally well lighted and ventilated. It contains two Walker air compressors, 24x41 steam cylinders, 23½x38 air cylinders, and 48-inch stroke, having a total capacity of 7,000 cubic feet of air per minute. They are complete with circulation pump and after-coolers. They are fitted with an automatic lubricating system.

The bankhead is of modern design and almost entirely automatic. The structure is of wood, hard pine posts, spruce and hemlock framing on concrete pedestals, electrically lit, and fitted throughout with standpipes and hose for fire protection.

The coal cars are handled by automatic up and down car hauls, a revolving tipple, and an automatic "kick-back." The coal passes from the tipple on to a triple battery of shaking screens, from which it is fed to the picking belts, two in number. These belts are 43½ feet long, 6 feet wide, speeded to 43 feet per minute, and, as will be seen from the snapshots accompanying, they are exceptionally well lighted. The unusual width of the belts, the slowness of their motion and their general design are such that coal can be cleaned to the best advantage with the minimum of breakage. The nut and slack coal is dealt with by transverse swinging conveyors. It may be safely said that No. 6 has the most efficient screening plant in Cape Breton.

Up to the present time the haulage has been effected by a temporary hoist, which is being replaced by a 26x48-inch Corliss valve engine, built by the Jenckes Company. This engine will be large enough to overtake the haulage demands of the colliery for a long time to come. The foundations contain over 300 cubic yards of concrete. The engine-house will be of wooden construction, with a brick fire wall on the side next the pit.

Until quite recently the mine has been ventilated by a small temporary fan. This has been replaced by a Walker "Indestructible" fan, 20x7 feet, having a rated capacity of 300,000 cubic feet of air at 3-inch W.G. It is driven by a 16x16-inch Robb horizontal engine.

The fan itself is steel cased on concrete foundations, and the fan race is also constructed of concrete. The fan engine-house is of entirely fireproof construction, built of brick, lighted by metallic fire-proof windows, and roofed with corrugated asbestos sheating.

Other surface buildings are the machine shop, blacksmith shop, colliery warehouse, office, lamproom, washhouse, stables, firemen's hall, emergency hospital, etc.

The machine shop is fitted with a 23"x16' Porter lathe, steam hammer, pipe threader, and various machine tools. The equipment is very complete, as No. 6 is a considerable distance from the main shops at Glace Bay.

For fire protection purposes a 500-gallon Knowles pump is provided, and a sufficient equipment of fire-fighting appliances. The mine has its own fire brigade. It has also two corps of men trained to use the Draeger apparatus, four of which are kept at the colliery.

Safety lamps are exclusively used, all of the Ackroyd & Best type.

The mouths of both slopes are protected by reinforced concrete arches. The pitch of the Phalen seam at No. 6 is a little greater than the average of this seam in the other collieries, being around 12 per cent. The main deeps are down 4,000 feet, and are extended 200 feet beyond the shore line. The cover at the shore is 375 feet, and two levels are now being driven in submarine territory. On the west side of the mine the levels are rapidly approaching the workings of the Old



No. 6 Bankhead—Picking Belts (Beginning of Loading Arm).

Clyde Mine, which was worked years ago, and lies about midway between the workings of No. 6 and No. 4 (Caledonia). The Phalen coal from the Old Clyde Mine bore an excellent reputation for quality.

No. 6 is connected by a branch line 5½ miles long

with the main line of the Sydney & Louisburg Railway, which runs a passenger train twice weekly between Glace Bay and No. 6 for the convenience of the residents. The village consists of about 130 houses owned by the company. They are situated near the shore, and command a good view of the opposite coast and the mines of Glace Bay.

The next article of this series will deal with No. 2 Colliery, and this will complete the description of the Phalen seam mines in the Glace Bay Basin.

THE PRESENT POSITION OF THE COAL DUST PROBLEM.

By Messrs. James and John Ashworth, Mining Engineers.

(Paper read before the Victoria Meeting of the Canadian Mining Institute.)

The subject of coal-dust is still one of the most important questions which can be discussed by any meeting of mining engineers, and it, therefore, deserves very careful and detailed treatment, but for the purpose of the present meeting and for the useful advancement of information on this particular subject, the authors have condensed their matter so as to provide ample scope for the discussion of possibly every phase of coal-dust theories.

At the outset it may be of advantage to state what we mean by "Coal-Dust," as connected with colliery explosions—generally speaking, therefore, when they refer to coal-dust they will have in mind the very fine dust which is ordinarily present in coal mines and continuously produced from the coal in course of transit from the working face to the pit shaft by friction and that such dust is more dangerous than the older dust which has settled on the sides, roof and timbering of the mine.

We submit the opinion that this dust is the most dangerous factor in all collieries, particularly where firedamp is produced, and think that the many disasters which have occurred in Canada and the United States of America, are sufficient in themselves to take as examples, to convince every careful observer and student of coal-dust phenomena, that terrible disasters such as Monongah and Darr were mainly due to the part played by floating coal-dust, and that the incomplete combustion of this dust, coupled with the heat due to the pressure developed, acting on the older dust, created the huge volume of carbon-monoxide gas which is the actual life destroying element of every collinery explosion. To make our views on the universal production of carbon-monoxide gas more clear, we have to express the opinion that the enormous and sudden pressure created underground by explosions of mixtures of firedamp and air, or of firedamp and coal-dust, or of air and coal-dust, is sufficient by itself to produce huge volumes of carbon-monoxide gas without the addition of actual flame, and in support of this contention quote the latest estimates of these pressures made by Mr. J. T. Beard, of the International Correspondence Schools, Scranton, Pa., and of Prof. H. M. Payne, of West Virginia University, U.S.A. The former in his recently issued text-book, entitled "Mine Gases and Explosions," estimates the possible pressure at 196 lbs. per square inch, and the latter at from 50 to 146 lbs. per square inch. (Mines and Minerals, February, 1908), and the difference in these estimates arises from the volume of air available, and particularly so in Prof. Payne's estimate, which was based on what he considered did actually occur at Monongah.

The sudden and instantaneous effect of these great pressures on the miners, is to produce loss of consciousness or in some cases death by concussion of the brain, and thus men are found in the precise positions they occupied at the moment of the explosion, or when less severe pressure is produced they are overtaken by the afterdamp before they recover consciousness and are thus poisoned and killed in a few seconds.

Authorities are divided as to whether a small quantity of dust or a dense cloud is the more dangerous, but the author's experience and observation leads them to the conclusion that in the majority of instances it is the dust floating in the air which is dangerous, and, therefore, if more than this comparatively small quantity is present there is then an insufficient volume of air to complete the combustion, and the flame is smothered out. Experience and observation also lead them to conclude that dust is more dangerous in a damp atmosphere than in a dry one, and that there are numerous cases on record where a mine has been described as dry and dusty whereas the air was either saturated with moisture or so nearly saturated that no more than one grain of water vapour per cubic foot would have completed the saturation.

Writers and experts on coal-dust phenomena are generally in accord in treating coal-dust as a very small solid, but the authors of this paper think that it ought not to be treated as solid but as a concretion of gases, because Prof. Bedseh, D.Sc., of the Armstrong College, Newcastle-on-Tyne, has proved by experiments, extending over many years, that every particle of coal-dust freshly produced from the coal face, contains both firedamp and other gases of the paraffin series under pressure, and that these are continuously giving off until the supply is exhausted, and that they are then replaced by oxygen from the atmosphere and not by air, as the atoms of nitrogen are too large to pass through the pores, and are, therefore, filtered out. Consequently it will be readily understood that freshly produced coal-dust being surrounded by the gases escaping from the store occluded in its own small body, floats, as it were, in its own balloon of gas, and is, therefore, immune from any dampness in the air current or, in fact, from any form of water. In many instances the expert evidence given to ascertain the initiatory cause of an explosion is evenly divided between coal-dust only or firedamp only, being the agency by which the original cause, generally a flame from a shot, was extended some distance into or throughout a colliery, and the authors submit that no enquiry of this class can in any case be complete, unless the dust has been examined by what they may term the "Bedson process," and that such an ex-

vestigation would be still more complete if the structure of the dust were examined under the microscope, as was done by Mr. W. E. Garforth after the explosion at Altofts, in England, several years ago (see the report of the Royal Commission on Explosions from Coal-Dust). Taking these two sets of experiments (both due to private initiative and not to the application of public funds) into plain matter of fact consideration the authors conceive that it has been proved by Mr. Garforth without the possibility of dissent that coal-dust is not a solid but is possessed of pores, and by Prof. Bedson that gases exist in these pores under considerable pressure, and, therefore, that every particle of freshly-produced coal-dust ought to be practically considered as a "gas" and not as a solid. As a gas bag surrounded by air it is in its most favorable condition and position to inflame, and explode, and thus to initiate or extend the effect of any flame which is of sufficient intensity to ignite it.

This course of argument and practical demonstration naturally leads up to another of their conclusions on the use of explosives, viz., that it is not possible to use any known explosive with absolute safety in a gaseous mine.

There is, however, another danger which is probably never taken into account, viz., that due to detonation. Every high or so-called flameless explosive requires the application of a detonator, and if the detonator is not sufficiently strong, ignition and not detonation is the result. But assuming that the detonation is complete and that it is an over-weighed shot, we have then to contend with results, which are, in some senses, more dangerous than a blown out powder shot, because we have created a huge detonating vibration which is unaffected by any amount of watering, and which may be communicated to the most distant corners of a mine without demonstrating any effects en route. Supposing, therefore, that either large or small accumulations of firedamp mixed with air exist in any part of a mine, these may be simultaneously exploded by this detonating effect. The Wattstown explosion in South Wales was probably an instance of this effect.

The question which naturally seems to follow this line of thought is, "What percentage of firedamp is permissible in a mine or place where explosives are used?" and this is not so easily answered, because experiments have already demonstrated that less than one per cent. may be dangerous. If, then, one per cent. of firedamp will make a mine dangerous, it would appear rather absurd to blast excepting in such cases where it is absolutely necessary, and then only under the most stringent precautions, but the absurdity of the position is increased when we find that the usual tests for firedamp are made with safety lamps which are incapable of discovering less than two per cent., and on this showing the mine is certified as clear from gas and safe for shots to be fired. The only possible safeguard which the authors have to suggest to add to the safety of gaseous mines when explosives are used, is to limit the weight of the explosive in each shot—that is to say, a large number of small shots might be safe where the same weight of explosive in one shot might cause a disaster—for the valuable discovery, "the charge limit," the writers believe we are mainly indebted to French engineers. The conclusion of the writers is that not more than one per cent. of firedamp is permissible, and that the weight of explosive per shot hole should be limited.

As to whether it is possible to render a coal mine safe against the initiation or extension of an explosion by any application of water, the writers are of opinion that it is positively impossible to restrain the extension of an explosion by any known means of applying water, and, further, that any form of water to dampen the air assists in the extension of an explosion, because as proved by Prof. H. B. Dixon the maximum explosive effect of mixtures of gas and air is only obtained when the atmosphere contains five per cent. of water vapour, and as this percentage can only be attained by the use of steam it is, therefore, an impossible application, and the writers say positively that there is no known means of applying water so as to control the extension of an explosion.

The difficulty of applying water does not, however, end here, because the weight of water which will saturate an air current may vary from, say, 4 to 13 grains per cubic foot, and, therefore, either 4 or 13 grains ought to be equally effective in controlling the extension of an explosion, but this propostion is absurd when we have already proved that five per cent. of the weight of the air and gas mixture is required to give the maximum explosive effect—that is to say, not less than 25 grains per cubic foot of the mixture.

Possibly resulting from the escape of the occluded gases from the coal-dust, it has been found to be extremely difficult to dampen fresh coal-dust, and a practical demonstration of this fact was given to the jurymen at the Monongah inquest by putting about a pound of fine dust into a basin of water, and after stirring it up, and pouring off the water, blowing into the dust when it immediately flew about the court room like soot.

The possibility of rendering a deep, dry and dusty mine proof against the extension of an explosion by water saturation has, however, another barrier against its adoption, and investigation has demonstrated in the mast positive manner possible, that if miners are to work in such mines with any degree of comfort or efficiency the air must be kept as dry as possible, so that the perspiration from their bodies can pass into the air and afford a sense of coolness, for if it does not, then the body temperature rises until what is now described as "heat apoplexy" results, with loss of muscular power, and the man dies. In many deep mines the heat ranges from 75 to 90 degrees Fahr, and, therefore, if the air were saturated with water (9.4 to 14.8 grains) the miners could not possibly work. About 8 grains of water vapour per cubic foot of air should be the maximum dampness permissible in the air of a deep mine.

Another phase of the coal dust problem still remains to be considered, viz., the explosion of dust in mines where firedamp has never been discovered, such as Camerton and Timsbury, in the Somersetshire Coalfield, in England, and so far no experiments have been made to ascertain if any or what gases are occluded in such coal-dust, and as these explosions have originated in old roads, it is possible that the dust had become altered by exposure to the air current, and having absorbed oxygen had become more susceptible to the influence of flame. Only by submitting such dusts to courses of experimental research similar to those already referred to can its ignition or explosion, when exposed to a flame of great intensity, be satisfactorily explained.

The possible speed of a coal-dust explosion has frequently been debated, but without reliable data on which to base an opinion, until the Monongah disaster, when the difference of time between the explosion reaching the surface outside of No. 8 and No. 6 mines

respectively, was observed to be five seconds, and one of the writers has calculated that this would give a speed of 3,000 feet per second. This fact is particularly interesting because it quite upsets those theories which require a considerable time to produce a series of explosions which are not instanteous, and do not take into account the effect of cooling or condensation.

The writers trust that these few notes on a subject which has such a wide range of interest may be sufficient to provoke very considerable discussion and result in the gathering together of much very valuable information, and also produce suggestions for some better and more effective means of exorcising the demon of coal-dust than the present-day ineffective systems of watering.

Note.—Messrs. J. B. and W. N. Atkinson, E. Bainbridge, W. E. Garforth and W. Galloway made an estimate of the velocity of the explosion at Altofts, based on the movement of materials, and this was placed at 99 to 100 miles.—Coal-Dust Report, Q. 3821.

If per minute this would be 7920-8799 feet per second, or more than the speed at Monogah, but if per hour this would only be 132-147 feet per second.

FROM OCEAN TO OCEAN—CANADIAN MINING INSTITUTE EXCURSION.

(By an Occasional Contributor.)

The excursion of the Institute for 1908 covered a larger mineral field than has ever before been visited, on a single excursion, by any party of men. The party gathered at Quebec City on August 24th, and proceeded to Sydney, Cape Breton; thence they gradually worked eastward, visiting the chief and more accessible mining camps in the various provinces, the last mines visited being those of Nanaimo, Vancouver Island, B.C.

There was a two-fold object in organizing this excursion. The Council of the Institute felt that it would be well for its representatives to visit various parts of the Dominion in order to become acquainted with local conditions, and to meet the men of the different camps at home. This part of the work of the excursion was successfully accomplished. The excursionists were splendidly received in the various centres, and they had the opportunity not only of becoming acquainted with the majority of the leading mining men of the Dominion, but they also met many of the chief public men of the various provinces. The excursion has thus made the Institute much better known, and it is felt that the work of the Institute will henceforth be more widely appreciated.

The second object of the excursion was to show the mineral resources of Canada to a number of guests from Great Britain and abroad. Among the societies that sent representatives on the excursion was the Institute of Mining and Metallurgy, London, which sent one of its past presidents, together with its secretary and two members of the Council. Then the British Iron and Steel Institute, the Institution of Mining Engineers, the Mining Institute of Scotland, the South Wales Institute of Engineers, and the Manchester Geological and Mining Society were also represented by well-known members. Among the foreign representatives were the chief geologist of the Prussian Geological Survey, a representative of "Stahl und Eisen," one of the Counselors of Mines of the German Government, and others. The United States was represented by a metallurgist from Columbia University and the Professor of Economic Geology of Cornell University. It may also be added that the party was fortunate in being accompanied by the Geographer of the Dominion and by the Dean of Forestry of the University of Toronto, and by other men who were important factors in making the excursion a success. It is doubtful if another party could be got together that possessed so many elements for success. We even had our own piper. The conductor of the sleepers pleased the Scotchmen of the party and others greatly by his playing. He led us to the nightly frays and brought us home after the slaughter!

The visit of the British and foreign guests of the Institute cannot fail to have an important bearing on the future of the mining industry in Canada. These men will each serve as a centre of information. It will thus be more difficult to misrepresent the industry abroad either by overpraising it on the one hand or decrying it on the other.

Everything contributed to make the excursion a success. As already said, the personnel of the party was right—it possessed the right elements. The presence of the guests of the party pleased the mining men at the various places visited, and made the excursion a greater success than if the party had been composed of Canadians only. During the six weeks of the trip the weather could not have been better. The arrangements of the party were not interfered with by rain at any point from ocean to ocean.

Too much credit cannot be given the railways for what they did to make the excursion a success. During the greater part of the eastern trip the Intercolonial was used, and its service was perfect. From Montreal west by far the greater part of the travelling was done over the Canadian Pacific, and satisfaction was expressed by members of the party for the service that this great railway afforded.

Quebec City.

The party gathered at Quebec on August 24th. They were given a kindly reception and a pleasant send-off at an informal meeting in the Chateau Frontenac by Sir Lomer Gouin, the Premier of the Province; Sir George Garneau, the Mayor of the city, and by the Hon. Mr. Devlin, Minister of Mines. While in the city the party were shown the new historic bridge and other points of interest which attract visitors from all parts of the world to the old city.

Sydney.

The arrangements in Nova Scotia for the entertainment of the members of the Institute and their guests were in charge of the Mining Society of Nova Scotia,

which had gathered in force at Sydney. The evening before our arrival members of the Nova Scotia Society, accompanied by Lieutenant-Governor Fraser, Premier Murray and Minister of Mines Chisholm, had come to Sydney. These gentlemen spent three days with us, and accompanied us on our visits to the Dominion Coal Company, to the Dominion Iron and Steel Company and to the mines and plant of the Nova Scotia Steel Company. Mr. Charles Fergie, the past president of the Institute, and other local men, had looked after the arrangements thoroughly, and the visiting members of the Institute were much pleased with what had been done in their behalf. At each plant visited a good opportunity was afforded of gaining a knowledge of the operations, and the excursionists were much impressed with the size of the coal field and by the scale on which the iron and steel industry is being carried on in Cape Breton.

Various entertainments were provided at Sydney. Luncheon was furnished to the party on each day of the stay by the three companies whose plants we visited. On one of the evenings a smoker was given, and one night was spent in a banquet at the hotel. It is not necessary to say more than that the banquet, smoker and luncheons passed off with the great success usual to such mining functions when held in Nova Scotia. After leaving the plant of the Nova Scotia Steel Company at North Sydney on the last day of the stay the party were the guests of Mr. James Ross on his yacht "Sheila," from North Sydney to Sydney, landing at the residence of Mr. J. K. L. Ross, where a garden party, of which the hosts were Mr. and Mrs. Ross, was attended by the excursionists and by representative people of Sydney. It is thus seen that there was considerable variety of entertainments at Sydney. They all tended to make our visit to Cape Breton a very pleasant one.

Quebec Province.

Leaving Sydney, the party proceeded directly to Levis, arriving early on Sunday morning. The day was spent by many of the party at the Chateau Frontenac. In the evening the Quebec Central train was taken for Thetford Mines, where the party was met by Mr. George R. Smith, past president of the Institute. We were shown over the mines and mill, which are under Mr. Smith's management, and also visited some of the adjoining properties. Leaving Thetford, the party proceeded a few miles to Black Lake, where they were met by Mr. Hopper, a member of the Council of the Institute, and by other representative mining men of the district. Several of the mines and plants in the vicinity of Black Lake were visited. Probably no mineral



C. M. I. EXCURSION AT FERNIE, B.C.

Building is office of Crow's Nest Pass Coal Company, one of the very few structures that escaped destruction by fire.

industry visited by the excursionists impressed them more than did that of the asbestos mines of Thetford and Black Lake. Few of the members of the party previously realized that the industry had reached such great dimensions and that it was still growing so rapidly.

Leaving Black Lake, the party proceeded to Colraine, where they visited the unique and interesting chrome iron ore deposits. Thence they proceeded to Sherbrooke, where they arrived in the evening, and left by an early morning train for Montreal.

On this trip through the asbestos and chrome district of Quebec the party was accompanied by the Hon. Charles Devlin, Minister of Mines of Quebec Province, who did much to add to the pleasure of the trip.

Montreal.

In the evening of the day of arrival in Montreal a banquet was tendered the excursionists by the Montreal branch of the Institute. The Montreal members are to be congratulated on the success of this banquet. The speeches of Hon. Mr. Devlin and others who were on the toast list were of an important character. Mr. Devlin assured the members of the Institute that he had been so impressed with the character of the work which the Institute was doing that he would recommend to the Quebec Legislature that an annual grant be given to the Institute. Moreover, he had decided to send his Superintendent of Mines through with the party to British Columbia in order that Quebec Province might benefit from advice tendered by members of the party concerning the development of mineral resources.

The following day was also spent in Montreal, the visitors being shown around the city by the local members, and being entertained at luncheon at the Hunt Club.

Toronto and Niagara.

On the morning of September 3rd the excursionists arrived in Toronto and took the boat soon after their arrival for Niagara Falls. Mr. P. W. Ellis, one of the commissioners of the Niagara Falls Park, had kindly made arrangements for the entertainment of the party on this side trip. The party had not only the opportunity of viewing the Falls and river scenery, but they were shown through some of the large power plants, and were well entertained through the care which Mr. Ellis had taken in making arrangements for the visit. A number of the local members of the Institute accompanied the party on this visit to Niagara, and assisted in entertaining them during the trip. On the morning of the 4th the party arrived in Toronto. During the day they were the guests of the Exhibition Directors, and had the opportunity of viewing the exhibits of minerals from the various provinces which were shown at this year's Fair. The reception by the Exhibition Directors took on the form of a Government reception, as the acting Premier, Hon. Mr. Foy; the Minister of Mines, Hon. Mr. Cochrane, and the Provincial Treasurer, Hon. Col. Matheson, were present and met the mining men.

Cobalt.

On the evening of the 4th the party left Toronto by special train over the Grand Trunk Railway for Cobalt. They were met at Temagami by Mr. Cole, chairman of the Cobalt branch of the Institute, and by Mr. Black, superintendent of the Temiskaming and Northern Ontario Railway. While at Cobalt and vicinity the party was in charge of Mr. Cole and members of the local branch, Mr. Black looking after the railway arrangements. The arrangements for the entertainment of the guests at Cobalt were perfect. Arriving at the station, Mr. Cole and the committee divided the party into several groups and arranged for their visits to various mines. It was somewhat unfortunate, however, that the party did not have more time in this camp. On the evening of the 5th, owing to smoke on Lake Temiskaming, it was found impossible to take the boat trip which had been planned from New Liskeard. During the evening the members of the party were met at Haileybury station by the founder of the town, Mr. C. C. Farr, and were escorted to the club, where Colonel Hay and other mining men had arranged a pleasant smoker.

Needless to say, the visitors were impressed with what they saw at Cobalt, and with their reception there. The souvenir pins presented by the local committee and the rich specimens of ore so freely given by the mines will keep the camp green in their memories. Cobalt can always be depended on to do the right thing, and always keeps open house.

Temagami.

On Sunday morning, the 6th, the party left Haileybury for Temagami, the Cobalt local committee having arranged for an excursion up the lake. Luncheon was served at the Temagami Inn, and the party returned to the train at Temagami station in the evening.

Moose Mountain.

On the morning of the 7th the party left Sudbury, accompanied by Mr. Hawkes, of the Canadian Northern Railway, and Mr. Leach, superintendent of Moose Mountain mine, for a visit to that property. A number of the citizens of Sudbury accompanied the party, and a very pleasant day was spent on the new railway line between Sudbury and Moose Mountain. This was the only working iron mine which the party had an opportunity of visiting during the trip. The visit was of interest to the excursionists owing to the fact that the deposit is somewhat characteristic of those which are of such great importance in the Lake Superior region.

Copper Cliff.

On the morning of the 8th the party were taken in charge by the Canadian Copper Company. Mr. Turner, president of the company, had made arrangements for the party to visit the splendid new smelter at Copper Cliff and the Krean Hill mine. The gentlemen associated with Mr. Turner were the mine manager of the company, Captain Lawson, and the metallurgist, Mr. Browne. The visit to the smelter, owing to its being so recently constructed and so up-to-date in all its parts, was especially interesting to the metallurgists of the party. Mr. Browne was congratulated on the plant which is directly under his charge. The Crean Hill mine also proved very interesting. Luncheon was given the party at Crean Hill by the company, and proved a pleasant function. It was what may be called the only camp dinner which the party had during the trip, and to many of them it was unique. The Hon. Frank Cochrane, Minister of Mines, who accompanied the party from Toronto to Cobalt and Sudbury, acted as toastmaster at the luncheon, and some highly complimentary things were said of Mr. Turner, his staff and the company which he represents. On returning in the evening from Crean Hill a visit was made to the Victoria Mines smelter, where the party was met by Mr. Corless and his staff. This smelter was of special interest to some of the English visitors owing to their

being acquainted with Mr. Mond and to their having followed the successful career of the Mond Nickel Company. On the return to Sudbury in the evening an informal gathering was held by a few of the excursionists in the King Edward Hotel, where two or three of the guests who had to return east from Sudbury were given a send-off. At Sudbury the party were joined by two or three gentlemen from abroad who had not been able to reach Canada earlier. Leaving Sudbury at midnight, the trip to Winnipeg and the West was begun.

Winnipeg.

Owing to a delay through the burning of a bridge on the railway near Schreiber, the party was not able to spend more than two or three hours in Winnipeg, a city which to the men from abroad was of special interest. They had all read of its rapid growth and present importance. However, they saw enough of the city to convince them that the descriptions they had read were not overdrawn.

At Winnipeg the party was met by Mr. Macpherson, who is in charge of this section of the Canadian Pacific Railway. The party is much indebted to Mr. Macpherson for the care which he took in making the trip westward go so smoothly. He sent his assistant, Mr. Dawson, with the party from Winnipeg, and at various points the party was joined by local representatives of the railway.

Medicine Hat.

The next point of mineral interest visited by the party was Medicine Hat. The trip over the prairie from Winnipeg westward was, however, greatly enjoyed. It seemed a new world. Many of the members of the party decided from the little they saw of the great wheat-raising provinces that Western Canada is indeed destined to become the granary of the Empire.

At Medicine Hat the party was met by the civic representatives of the town and by members of the Board of Trade. Medicine Hat's mineral industry, as is well known, is that of natural gas. They probably make more varied uses of this substance at Medicine Hat than is made of it in any other part of the world. They use it not only for domestic purposes, lighting and heating, but also in the boilers and forges of the Canadian Pacific Railway shops. They are now charging the cars with natural gas, and it is said that the supply of this gas on a car, when it is properly charged, will last longer than will the artificial gases that are ordinarily used for the purpose. Moreover, small pipes are strung along the rails of the track, and the gas is used for keeping locomotives warm when they are standing on the track waiting for orders during the winter. The party was given the opportunity of seeing these various uses which are made of natural gas, and they were also shown the methods by which the flow and pressure are measured.

The people of Medicine Hat are certainly enthusiastic concerning their town. Since the recent visit of Rudyard Kipling they are probably, to use a colloquialism, more "chesty" than ever. On the front page of some of the literature with which they supplied us they have Kipling's saying, as applied to their town, "The town that was born lucky." Moreover, Kipling seems to have been impressed with the immense store of natural gas which has been tapped in the town, and one would think that he favors the inorganic origin of gas as opposed to the organic, since he is quoted as saying, according to the literature supplied by the town, that "This district seems to have all hell for a basement." Mr. Coste, who, as we all know, has been a strong contender for the inorganic origin of gas, has apparently made a distinguished convert in Kipling.

A few miles out of Medicine Hat, at Dunmore Junction, Mr. Coste had arranged to show the party the gas well which had been drilled under his direction a short time before. After showing how the pressure was read and the flow of gas determined, the well was allowed to blow off, and was finally ignited.

Lethbridge.

According to the programme, the party was to visit Lethbridge and other mining camps along the Crow's Nest branch of the railway before coming to Fernie. Owing to the delay at Schreiber it was found necessary to alter the programme and to visit only two or three mines. Hence Lethbridge and some other important mining camps were passed by. At Lethbridge the Hon. Mr. Cushing, Minister of Public Works, Alberta, joined the party and spent the following day with it.

The great landslide at Frank was visited, and at Coleman the party met Mr. Whitesides, who had done so much in making arrangements for the visits to the coal district along the Crow's Nest Railway. A short visit was made to the mine at Coleman and to the newly erected plant at Hosmer.

Fernie.

Mr. G. G. S. Lindsey, president of the Crow's Nest Pass Coal Company, and Mr. R. W. Brock, acting director of the Dominion Geological Survey, joined the party at Winnipeg and accompanied it throughout the trip to Alberta and British Columbia. It is needless to say that both these gentlemen did much to make the trip a success. Having had Mr. Lindsey with us for a few days, we felt perfectly at home on arriving at Fernie, the headquarters of his company. A visit was made to Coal Creek and the mines there. Members of the party expressed themselves as being much impressed with the great coal deposits of this company. The staff took much pains in showing the excursionists through the mines and over the surface plant.

Although Fernie, a town of about 5,000 people, had been practically wiped out by fire a few weeks before our visit, the members of the party were surprised to see what had been done towards rebuilding in the interval. Building was going on not only during the daytime, but the hammers could be heard far into the night. The rapid rebuilding of the town greatly interested the visitors. They here saw something of the pluck, determination, and enthusiasm of the Western people.

Among the few buildings that escaped the great conflagration were the general offices of the Crow's Nest Company. Mr. Lindsey and his staff arranged a smoking concert for the party in the offices in the evening. Those who are acquainted with Mr. Lindsey's skill as an entertainer need not be told that this smoker was a great success. Mr. Lindsey not only made use of his staff, but he called on His Worship the Mayor of the town and on the Chief of Police. Having the Chief present, he was able to make some members of the party perform who had never shown any signs of possessing a "lighter vein" on the earlier stages of the trip. However, having a piper to lead us, we all succeeded in reaching the cars again some time after midnight.

Moyie.

The party left Fernie in the early hours of the morning, and spent the next forenoon in a visit to the mine

and plant of the St. Eugene mine at Moyie. This is the largest silver-lead mine in Canada, and the visit was much enjoyed. Proceeding from Moyie in the afternoon, the party, after leaving the railway, crossed Kootenay Lake to Nelson, where they were met by representatives of the Board of Trade and other gentlemen, who promised them a good time when they re-visited the town in a few days.

Bonnington Falls.

Leaving Nelson in the evening, the party made a night visit to Bonnington Falls, where power for several large mines and plants is developed. Mr. L. A. Campbell and his staff showed the party through this modern and attractive plant. The company, which is known as the West Kootenay Power and Light Co., Ltd., had prepared a pamphlet, giving an account of their plant, which was of much assistance to the guests on their visit, and now forms an interesting souvenir of the trip.

Trail.

Having to make up time lost on the earlier part of the trip, it was found necessary to visit both Trail and Rossland in the one day. This was unfortunate, as all the members of the party felt that they would like to have put in considerably more time in each place.

We arrived at Trail in the morning, and were met by the staff of the smelter and refining company, who showed us through their very interesting plant. Descriptions of this plant have appeared in the press, and it is not necessary to say more concerning it than that it proved to be one of the most interesting places visited during the whole trip. The electrolytic lead refining attracted much attention.

Rossland.

Leaving Trail, the party proceeded to Rossland, where they were met by the local committee, and were entertained at luncheon, afterwards visiting the various mines of the camp. The stay in Rossland was, of course, all too brief, but the party were shown some of the typical stopes and some of the deeper levels of the mines, and were gratified to see how promising the industry is at the present time. Between the visit to the mines and the banquet in the evening, the members were entertained at the attractive Rossland Club.

The banquet, which was presided over by Mr. A. J. McMillan, was a decided success.

The "Rossland Miner" of September 19th gives a full account of the visit of the Institute to Rossland, and is one of the most interesting newspaper issues concerning the excursion which was published during the trip.

Greenwood.

After the banquet at Rossland the party proceeded to Trail, and left for Greenwood, arriving there in the forenoon. They were met by Mr. Keffer, who was president of the Institute last year; Mr. McAllister, and other representative men of the district. A visit was then made to the British Columbia Copper Company's mine and smelter. This mine is of a different type than any we had seen on the trip, and it was a surprise, to some of the party at least, to see what was being done with ore of this grade. The ore body has been systematically blocked out and sampled. So far as the mining is concerned, there is no guesswork about the operations. The same may be said of the smelter. The party were interested in seeing how few men it took to operate this smelter.

As explained by Mr. Keffer and Mr. McAllister, the success of the operations of the British Columbia Copper Company depends on several factors. Firstly, the large size of the ore body; secondly, its uniform grade; thirdly, its being self-fluxing; fourthly, little or no timber being required in mining.

In the evening a smoker was held in Greenwood. This had its special features, but it is not our intention to go into details concerning any affair of this kind.

Phoenix and Grand Forks.

Leaving Greenwood, the party proceeded to Phoenix, where are situated the mine of the Granby company. At Nelson we had been joined by Mr. B. W. Hodges, the general manager of the Granby company. Mr. Hodges is the very active chairman of the British Columbia branch of the Institute, and had given considerable time to organizing the trip in British Columbia. At Phoenix he and his staff showed us over the extensive works and plant of the mine. Some idea of the size of the works can be gathered when it is said that 20,000,000 tons of ore are blocked out. This ore, like that of the British Columbia Company at Greenwood, is self-fluxing. After luncheon, provided by the company at Phoenix, the party left for Grand Forks to visit the Granby smelter. They were there met by the Mayor and other officials of the town, and given a hearty welcome to the town. It may be added that Grand Forks does not depend on the mineral industry alone, but that the surrounding district supports a very prosperous fruit industry. The Mayor and the gentlemen accompanying him made our welcome concrete by presenting us with some baskets and boxes of beautiful fruit of the district, together with several bouquets of their flowers to be used on our dining car.

The smelter at Grand Forks handles about 3,500 tons of ore a day, and it is said that in the not distant future 5,000 tons will be treated.

In the last volume of the transactions of the Institute an account of some of the operations of the Granby company is given. The paper which Mr. Hodges read during our visit to Victoria gives further details.

Nelson.

Leaving Grand Forks in the evening, the party proceeded to Nelson, where they were met by the local committee, of which Mr. Leslie Hill was chairman, and Mr. Beeston, secretary. As the members of the party had been somewhat strenuously at work since their arrival in British Columbia, the Nelson local committee thoughtfully decided to give them a day of rest. They had arranged to take the party on a trip up the beautiful Kootenay Lake, where we got glimpses of glaciers, views of fruit orchards and mineral springs, and at one point where we stopped some members of the party deserted us to enjoy themselves fishing for a few hours. Luncheon was served on the boat, and afterwards a call was made at the Blue Bell mine, where we were received by Mr. S. S. Fowler, who was president of the Institute some years ago. The Blue Bell mine is a type of ore body new to some of us. Its development and the treatment of its ore by Mr. Fowler will be followed with interest by many of the party. On the return trip to Nelson dinner was served on the boat. In fact, it may be called a banquet. Everyone was surprised at the successful way in which this large dinner was carried out on board the steamer. It is only necessary, however, to say in explanation that the service was under the direction of C. P. R. officials.

After dinner on the boat, Mr. Hodges showed that he

could do something more than run the largest metal mine in Canada and organize excursions. He showed that he had musical qualifications. He took charge of the piano, and, others assisting him, a successful musicale was given.

On arriving at Nelson about 9 o'clock it was found that our train would not leave till about midnight. The party was therefore invited to the Nelson Club to spend the intervening hours. It would not be well to describe in detail what happened at the club. Some members of the party might not be let go away from home again alone. One feature, however, of the entertainment at the club will be long remembered. It might be called the union of nationalities, six men, representing different nations, standing together on what we shall speak of as an elevated platform, and one after the other making a speech characteristic of his country. The performance with the interpreter was especially good.

Revelstoke.

The party left Nelson and proceeded to the Arrow lakes, where boat was taken to Arrowhead, our cars having been ferried across ahead of us. From Arrowhead we proceeded to Revelstoke. The scenery on both the lake and in the vicinity of Revelstoke proved very attractive to most of the party, as did also the trip through the Fraser Canyon and on to Vancouver.

Victoria.

We left Vancouver by steamer in the forenoon for Victoria, where it was intended that we should have a restful time for two or three days. After dinner, at the hotel, the Mayor of Victoria welcomed the members of the excursion party to his city. Next morning a meeting of the western branch of the Institute was held in the Parliament Buildings. Mr. Hodges presided at this meeting, and the excursionists were welcomed by Premier McBride, who is also Minister of Mines for British Columbia, and by the Hon. William Templeman, Minister of Mines of the Dominion, whose home city is Victoria.

After these addresses of welcome, papers were read by Mr. Sutton on "The Geology of Vancouver Island," by Mr. Hodges, on "The Granby Mines," and by Mr. Ashworth, on "Coal Dust." All these papers proved to be of live interest.

During the rest of our stay in Victoria several entertainments were provided, the Lieutenant-Governor inviting the excursionists to a garden party at Government House, and a reception was held by the Premier and representatives of the Government in the Parliament Buildings on one of the evenings. The members of the party were also the guests of the Victoria Exhibition Directors.

Most of us had heard that Victoria is a very attractive city, and we were not disappointed in our visit to it. One thing that strikes the visitor is the extensive grounds with the beautiful trees which surround so many of the residences. One might say that

"Here lawns extend that scorn Arcadian pride."

Nanaimo.

On the morning of September 24th the party took train from Victoria for Nanaimo. This proved an attractive trip through the island. We stopped for a short visit at the plant of the Tyee Copper Company smelter, at Ladysmith, where we saw the unloading of ore from some of the northern islands. Being so well situated as regards water transportation, this smelter should get a varied supply of ore from the deposits which are known to occur on the coast of British Columbia.

Arriving at Nanaimo, we were received by members of the city corporation and others and entertained at luncheon. In the afternoon the party was taken in carriages to the collieries of the Western Fuel Company. A number of the members of the party went underground and spent some time in viewing the works. After leaving the collieries the party was taken on a visit to the Hamilton Powder Company's extensive plant, which proved to be an interesting and novel visit.

In the evening the party were the guests of the people of Nanaimo at a dinner, at which the Mayor presided. Altogether, our trip to Nanaimo was a very pleasant and instructive one.

During our stay on Vancouver Island Mr. E. Jacobs, secretary of the western branch of the Institute, did much to smooth our way and make the trip a success.

Vancouver.

We took steamer at 7 o'clock in the morning from Nanaimo for Vancouver. On arriving at Vancouver we were met by the local committee and were taken in automobiles through the beautiful Stanley Park and around the city.

The City Council, Board of Trade and Stock Exchange had arranged for our entertainment in Vancouver. The local members of the Institute had been very active in furthering arrangements, and it can be said that the luncheon in the Vancouver Hotel was one of the most succesfsul functions of the trip. Mayor Bethune presided, and addresses were made by the Hon. Carter-Cotton, Mr. Waghorn, and others. The vsitors were loud in their praise of Vancouver city. It has had a more rapid growth than almost any city in Canada, and now presents a most substantial appearance. Nature has done a great deal for the city. It has splendid harbor facilities, probably the purest water supply of any city of its size in Canada, and a most magnificent park.

The Return Journey.

The party left Vancouver in the afternoon on the return trip, the cars having been cleaned and re-stocked during our visit to Vancouver Island. At Revelstoke Mr. Lindsey and two or three other members of the party left us, they going via Nelson to Fernie. The trip through the mountains eastward could not have been more pleasant. The weather was clear and fine, and the glaciers and other natural beauties of this famous region showed at their best.

Nor was a sight of big game lacking on this trip through the mountains. Members of the party are not quite certain, even now, whether the bears which Mr. Brock pointed out to them at the foot of a slide were tame ones or not. He had been telling some members of the party what they thought were pretty tall bear stories, and he had told them that he would show them some bears along the route. Sure enough, a short distance west of Glacier he pointed to a black specimen and a brown one at no great distance from the track. The brown one seemed to be almost too unconcerned to be in his native state. Some of us suspected that Mr. Brock had got one of his friends to let his tame bears loose for our bentfit—and for his reputation!

Calgary.

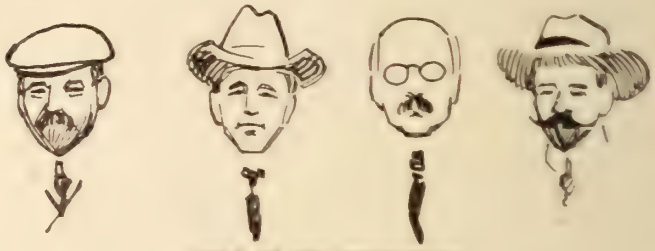
During the visit to Nelson the members of our party had met Mr. P. Burns. There must have been some kindred spirits in the party—that is, kindred to Mr. Burns—as we there and then received an invitation to visit his ranch at Calgary on our trip east.



ST. SIMEON OF CALGARY.

On our arriving at this progressive and rapidly growing city we were met by Mr. Burns and other men of the city and were escorted in automobiles to Mr. Burns' stock yards, where an exhibition was first given of broncho-busting. Mr. Burns had had his men collect some of the worst outlaw horses in the district. He had also invited some of the champion riders of the country to be present, and the exhibition that was given was certainly true to life, to say the least. We all feel that we have seen some of the best riders and the best buckers of the West.

But while the broncho-busting part of Mr. Burns' entertainment was good, the second part, the cattle-taming exhibition, was even better. In an enclosure with a barbed wire fence six strands high, facing the open prairie, Mr. Burns' men had collected some of the wildest and best-running steers in the territory. When the party had gathered at the side of the enclosure these steers were led out one or two at a time, and the horesmen showed their skill in roping them. All went well until about the sixth steer had been given his chance of getting away on the prairie. This animal was one of the wide-horned Texan variety. He ran out on the prairie for three or four hundred yards, and was finally roped by a rider. The saddle-girth broke, and the rider was unhorsed. In the mix-up the steer lost his bearings, and appeared to the crowd to charge the

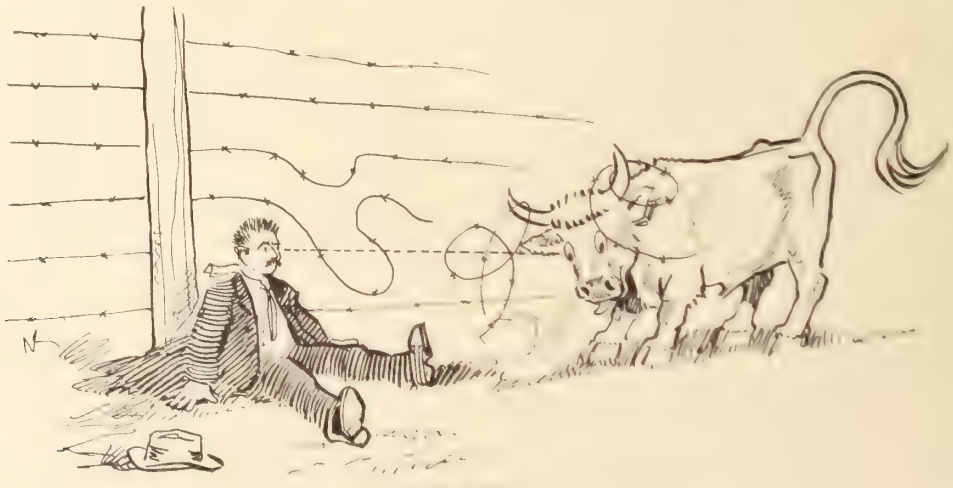


SOME OF THE PRINCIPALS.

prostrate rider, who, however, succeeded in rolling out of his way. The steer then came back towards the enclosure and directly towards a group of forty or fifty men who were bunched near the high wire fence. Every man in the party thought the steer was coming straight for him. With tail up and head down, on came the steer,

"Untired, untamed, and worse than wild."

The men meanwhile tried climbing the fence. The Cobalt representative, being used to climbing mine ladders, succeeded in reaching the top of the highest post, and felt secure resting on its top. He sympathized with his fellows as the steer rushed by. Unfortunately,



THE CRISIS.

a few yards beyond the party the steer charged the fence and went straight through it. This charge of the steer shook the Cobalt man off the top of the post, and when he picked himself up he was inside the enclosure facing the steer. All that he had ever read of matadors in the ring flashed through his mind. He made an

heroic effort and succeeded in cowing the animal by mind power. The steer turned away, and the Cobalt man again climbed the post. Other members of the party were not so fortunate. At least fifteen men had bleeding hands, cut by the wire, and many articles of clothing, torn on the fence, had to be discarded. Doubtless Mr. Burns' entertainment will be remembered by the excursionists when many of the mining camps are forgotten. On the way eastward, two or three days after the Calgary visit, one of the members was heard to say,

"It Burns at Calgary."

While on the subject of ranching, it may be added that when we first got into the cattle country on our way west one of the members of the party asked: "Do the cowboys milk the cows?"

Conclusion.

After leaving Calgary the party proceeded directly to Montreal, arriving on October 2nd, where a number of the members from abroad took their ships a day or two after.

In the foregoing account of the trip it has been impossible, owing to lack of space, to say more than a few words on each locality visited. Many of the mines and plants have, however, been described in technical journals, and doubtless a number of papers will be published by members of the excursion. The men from abroad frequentely commented favorably on the literature with which they were furnished on the trip. This literature included geological descriptions and mining data on nearly every locality visited.

COBALT COMMENTS.

ALEX. GRAY.

Scientists Must Decide.—By common censent the Montreal River and its tributaries traverse territory regarded by field geologists as the heir-presumptive or heir-apparent to Cobalt. What the division of the unentailed estate is likely to be only the specialist in prospectus lexicography will attempt to detail. He has already bequeathed putative wealth "surpassing" Cobalt and a "rush," which means to mining investors that they need not "come early" if they would "avoid the rush." Cobalt was the very rare exception where "first come, first served" rewards obtained. Too frequently mining vistas have "dead ends," and before Elk City's suburbs become fashionably residential and industrial, it will be material that the "surpassing" business be carefully managed, "Fly City" being the solitary urban centre where the preposterous spells prosperous. There has been less of the vainglorious about the Montreal River mineralized areas. Early settlers were unsettled by stratigraphic innovations and affected by objurgations directed at Cobalt promoters. They staked "conglomerate," blazed their way around quartzite, uncovered what they could for "discovery" purposes, and "snowshoed" what they could not find. Blizzards and "black flies" were not deterrents; yet what violent fluctuations there were in the market for claims had a downward tendency until ciphers began to be lopped off the affixes, and numerals prefixed were modified in inverse ratio. The scientist (and the capitalist behind him) was more omniscient than omnipresent. Too much gas was leaking from Cobalt's balloon and Montreal River claim owners perforce had to resort to the perachute. It has followed that a course in the school of adversity has effected more of reason than of riches, and without traversing the contentions of specialists as to Cobalt's superiority, the undemonstrative scientist has put the intelligent prospector in the middle of the thoroughfare. Without that scientist the accommodations at Elk City would not have been augmented and "assessment work" would be the limit of development in other than isolated instances. With that scientist there is no "rush," stampede or scrimmage. He has not been entirely satisfied with the fissuring in some of the townships; he has been thoroughly dissatisfied with the tactics of those who undertook to make claims-mongering a menace to the mining sciences. Ultimately rationalism has prevailed and there is a likelihood of equitable arrangements by which the party of the first part will not deprive the party of the second part of his hope of future reward and incidentally consign the section to demnition. As a further compromise Gowganda might be the metropolis and re-christened Barlow, leaving it for that scientifically named ste to contest for honors with Miller. In either event there need be no "rush" nor is it advisable to have recurrecnes of such incidents as the following, related in a Renfrew paper:

"At Gowganda Lake slabs weighing 40 pounds are removed without putting in a shot. At that point there are some 1,500 men, with the transportation problem one of the most serious ones confronting them. Every owner of a canoe carries his paddle with him when leaving the water, to guard against the disappearance of his canoe in his absence. What he calls a Marathon race, with a mine as the prize, Mr. Connolly saw during his trip. A dispute arose as to the ownership of a claim and the mining inspector was asked to settle the question. Two men each represented the rival claimants, and upon a decision being arrived at in the recorder's office two canoes moved off at top speed for a new staking of claims. The distance to be travelled was fifty miles. One of the men in the race was a Renfrewite. One couple upon arriving within eighteen miles of the coveted claim set off some dynamite, as a signal to men stationed farther in and these in turn passed the signal along, resulting in a new staking taking place, one of the claimants beating the other by a good margin. Such is life n a mining country."

Is it a coincidence that the signal was pre-arranged? Verb. sap. More of this on the "rush" would make "life in a mining country" an excellent thing to forego.

Economic Cross Purposes at Cobalt.—Events in the north country, apart from trapping and lumbering, had their beginning when those Canadians, McKinley, Darragh, the McMartins, La Rose, Hebert, Trethewey, Longwell and, above all, Miller, discovered and diagnosed cobalt. Gradually this fact has been brought home to Canadian men of affairs, but the dawning has been so unnecessarily prolonged that those who should have been the beneficiaries now must be satisfied with seats at "the second table." It is undoubted that the

business interests of the Dominion were slow to realize the potentialites of Cobalt. They are hardly awake to the accumulating possibilities and probabilities of the districts surrounding Cobalt—districts quickly appealing to alert aliens with affinities for the best there is and more of the same. Probably these sources of profit are as safely conserved in New York as they would have been in the custody of "original owners." They were financed in the States because Canada defaulted. Inevitably the larger and richer areas have gravitated to the pockets of these who really took few risks when they assumed well-guaged certainties, and so five prosperous companies which have paid 53 per cent. of all the dividends from sixteen companies at Cobalt are directed from Broadway, Buffalo and Rochester. These companies have sent away about 60 per cent. of Cobalt's output. Nine of the producing non-dividend companies have New York control. Three are in the crucibles. Perhaps it does not matter so much so long as more mineralized sections are being opened out, but the indifference of dominant forces in Canadian communities to the precious metal contents of the north country will either have to be modified or there should be a surcease from grouching when Americans appropriate "the persimmous."

It is not a matter for off-hand criticism that plums have been plucked by those with the quickest and longest reach. Rather is it a subject for review to be taken as a course in neighborly affection and co-operation without being inhospitable toward visitors with credits at their disposal. Then the equities will be preserved and more of the La Rose net earnings of $3,850 per working day will revert to "the place of issue," more of the Nipissing profits in corresponding degree will remain here, along with the daily proceeds of about $2,500 from the Coniagas; and the Kerr Lake Company's daily contribution of about $2,525 will also be balanced between residents south of the Bronx and those north of the Great Lakes.

What Canada loses by its liberality, notwithstanding the La Rose cannot be said to have involved a sacrifice is displayed in the profit sheet of these standard mines. Not alone have losses in minerals unaccounted for been grievous, and refining costs adverse until within this year, but much of the power of the wealth produced has been directed toward the purchase of more of the mines, until the whole situation becomes such as to warrant at least more than casual comment.

To make it clearer that while millions are being made at Cobalt, millions more could be saved there these figures are offered with the morals they contain:

NIPISSING'S COMPLETE SCORE SHEET.

	1904	1905	1906	1907	Aug. 1, 1908	Grand Total
Cars—	2	20	81	88	53	244
Dry weight, pounds.....	124,659	939,373	4,018,587	4,804,426	2,793,148	12,680,193
Silver—						
Contents, ounces	32.13	753,153.90	2,239,832.07	2,241,506.01	1,724,050.57	6,958,574.68
Ounces paid for.....		706,193.96	2,087,463.07	2,090,631.26	1,604,465.92	6,488,754.21
Value, less mktg. costs, $		424,936.16	1,390,343.61	1,269,645.46	850,614.49	3,935,539.74
Nickel—						
*Contents, lbs.	8,475	45,684	71,521.21	71,914.17	13,112	210,706.38
Receipts, $.....	635.05	370.93	4,276.48	708.33		5,990.79
Cobalt						
*Contents, lbs.	18,533	90,496.17	156,356.71	107,413.69	73,896.53	446,696.10
Receipts, $	23,148.03	58,005.38	96,236.11	39,281.89	17,680.04	228,351.45
Arsenic—						
*Contents, lbs.	76,249	288,995.32		130,950.05	231,280	727,474.37
Receipts, $	350.82			588.79		969.61
Totals of						
Value received, $.....	24,163.90	477,312.47	1,490,856.20	1,310,224.49	868,294.53	4,170,857.59
By-products unmarketed.						40,061.00

*Only applies to ore assayed for these metals and for which payments were made.

SOME LA ROSE ESTIMATED RETURNS BY CONTRAST.

	1904	1905	1906	1907	To May 31 1908	Grand Total
Dry weight, lbs.	84,439	168,478	751,807	418,860	331,846	1,755,439
Silver—						
Contents, ounces	69,605.73	117,768.84	1,217,658.54	546,092.48	363,507.63	2,314,633.21
Value, gross, $.....	38,291.84	82,308.92	828,791.16	345,395.34	199,785.20	1,494,572.46
Value, net, $.....	34,478.28	*82,131.62	742,263.06	316,271.53	181,489.33	1,356,633.82
Cobalt, Nickel, Arsenic—						
Value, net, $.....		7,367.52				7,367.52
Totals of Value—						
Received, $	34,478.28	84,499.14	742,263.06	316,271.53	89.33	1,364,001.34

*Including cobalt, nickel and arsenic.

ANALYSIS.

Nipissing, gross value per ton shipped.....	$637 86
La Rose, gross value per ton shipped.....	1,700.10
Nipissing, net value per ton on silver contents.....	62 71
La Rose, net value per ton on silver contents.....	1,534.00
Nipissing, average per ton on cobalt, nickel, arsenic contents.....	37 10
La Rose, net value per ton on cobalt, nickel, arsenic contents	8 39

To mining men these tables represent profits and losses on contained minerals. To Canadian men of affairs they represent incidental trade and about 25 per cent. of the gross value of the products—enough if there was more of it and if the other two or three quarters were restored upon Canadian terms. Instead of this the attitude of Canada has been either passive or repellant toward its mining fields, and its surplus funds are scattered all the way from the Rio Grande to Terra del Fuego, while even the economies essential to the

local treatment of Cobalt's complex ores are in "the other fellow's" balances, vide the foregoing data and this from the annual statement of the managing director of another prosperous mining company, the Kerr Lake:

"The price of silver during the year has fluctuated greatly. Last year we obtained an average of 67¾ cents per ounce for our silver, while this year we have been forced to sell it as low as 51¼ cents. This condition cannot remain for any great length of time, as the metal is now far below the normal price. Under the existing conditions we are producing only sufficient ore for our requirements, which are our quarterly dividend of $90,000 and our working expense and outlay for additions and improvements, averaging about $15,000 per month. The marketing of our product has been a very serious matter, inasmuch as the smelting works were unwilling to buy the very rich ore which we produce, owing to the difficulty of gettng a correct sample by the ordinary means common in the purchase of silver ores. We attempted to cupel, or reduce, the entire amount of our shipments by melting the ore down and taking the resulting silver, but the losses by and the cost of this method we found to be so great that we abandoned it. Experiments at the mine have been undertaken during the year by our engineer, whereby a good deal of the meal is separated from the ore before it is shipped. In July, for instance, 1,000 lbs. of native silver were taken from the ore by the simple process of crushing and screening. By carrying this method a little further we will be enabled to ship ore to the smelters which can be sampled with less difficulty, and marketed, we believe, without the troubles which have been encountered during the past year."

Not only is it in evidence that Nipissing, La Rose and Kerr Lake have been earning large percentages for owners. It also is painfully apparent that silver on the down grade and involved in precarious markets was handicapped by the "undesirables" associated with it in the form of cobalt, niccolite, arsenic. At the Coniagas and O'Brien it is not so. Everywhere else economic minerals associated with the silver have proved to be hardships leaving it for the richer properties to meet their obligations out of the silver. The Nipissing alone throughout has made the subordinate metals a substantially profitable factor. Others have come into line under the leadership of La Rose, O'Brien, Coniagas, Buffalo, Trethewey, McKinley-Darragh, Hudson Bay and Right of Way. Concentration of lower grade ores and "crushing and screening" as prescribed for the Kerr Lake and Nova Scotia, will doubtless alter the complexion of balance sheets; but the Government sampler would materially aid in this if its erection is not to be indefinitely deferred. None of the mines will acquiesce in the metallurgical reprisals of the past. They cannot. Had the La Rose been mined as scientifically as it is under the present administration it would have had more to show for it; and if the Coniagas smelter at Thorold will elaborate the advantages of its imperium in imperio policy from drill bit to refinery, Cobalt will be better able to demand the support so grudgingly granted by all but outside capitalists, and almost denied by Canadian financiers.

Great pressure is used in manufacturing the new shingles of asbestos-fibre and Portland cement, and they absorb only 5 per cent. of their weight of water. Hydration and gradual crystallization on exposure on roofs make them absolutely impermeable.

BEHREND DRY CONCENTRATOR TEST.

Milton L. Hersey Co., Ltd. Montreal, Aug. 8, 1908.

Certificate of Assay.

Sample of Cobalt ore received from Mr. Louis B. Jennings, Corona Hotel, Montreal, marked "Heads, Cobalt Lake Dump": Gold, none; silver, 35.5 ozs. per ton of 2,000 lbs., value per ton $18.81; cobalt, 1.57%; nickel, 3.10%. Silver at 53c per oz.

September 10, 1908.

Sample of ore crushed, received from Mr. Louis B. Jennings, Corona Hotel, Montreal, marked "Concentrates, Cobalt Lake Dump": Silver, 149.1 ozs. per ton, value per ton $76.04; cobalt, 7.06%; nickel, 18.07%. Silver at 51c per oz.

Sample of ore crushed, received from Mr. Louis B. Jennings, Corona Hotel, Montreal, marked "Tails, Cobalt Lake Dump": Silver, 12.0 ozs. per ton, value per ton $6.12; cobalt, 0.17%; nickel, 0.94%. Silver at 51c per oz.

OHIO COAL MINES.

The following act was drafted at the instance of the Ohio miners, and passed by the last session of the Ohio Legislature, becoming a law on the 3rd inst.:—

An Act Governing Power, Other Explosives, and Blasting in Coal Mines.

Be it enacted by the General Assembly of the State of Ohio:—

Section 1. Storing blasting powder or other explosives.—No blasting powder or other explosives shall be stored in any coal mine, and all powder sold to miners by the keg shall be packed in kegs which have an opening at the edge two inches in circumference, and that can be conveniently opened, to avoid the dangerous use of picks to open the same; and no workman shall have at any one time more than one 25-pound keg of black powder in the mine, nor more than three pounds of high explosives; and no explosive shall be taken into or out of any part of the mine in mine cars propelled by electric power; and no person shall keep blasting powder, or explosives, dangerously near the electric wire or power cable in any part of the mine where electric wires are in use.

(a) Boxing and Distance.—Every person who has powder or other explosives in a mine, shall keep it or them in a wooden or metallic box or boxes, securely locked, and said boxes shall be kept at least five feet from the track, and no two powder boxes shall be kept within twenty-five feet of each other, nor shall black powder and high explosives be kept in the same box.

(b) Handling Explosives.—Whenever a workman is about to open a box or keg containing powder or other explosives, and while handling the same, he shall place and keep his lamp at least five feet distant from said explosive and in such position that the air current can not convey sparks to it, and no person shall approach nearer than five feet to any open box containing powder or other explosives with a lighted lamp, lighted pipe or other thing containing fire.

(c) Tamping.—In the process of charging and tamping a hole, whenever in the opinion of the mining department this becomes necessary, the needle used in preparing a blast shall be made of copper, and the

tamping bar shall be tipped with at least five inches of copper. No coal dust nor any material that is inflammable, or that may create a spark, shall be used for tamping, and some soft material must always be placed next to the cartridge or explosive.

(d) Firing Shot.—A miner who is about to fire a shot with a manufactured squib shall not shorten the match, saturate it with mineral oil nor ignite it except at the extreme end; he shall see that all persons are out of danger from the probable effects of such shot, and if it be a rib shot, he shall notify the person or persons working next to him on said rib before said shot, and shall take measures to prevent anyone approaching by shouting "fire" immediately before lighting the fuse; no person shall return to a missed shot until five minutes have elapsed. And when it is necessary to tamp dynamite, nothing but a wooden tamper shall be used.

Section 2. Penalty.—Any person violating any part of this Act shall be deemed guilty of a misdemeanor, and upon conviction be fined, not more than one hundred dollars, nor less than five dollars, at the discretion of the court.

Section 3. This Act shall take effect and be in force six months after passage.

CONDITIONS OF EMPLOYMENT IN NOVA SCOTIA COAL MINES.

Coal mining companies, operating in Nova Scotia, are required to keep in the office at the mine a register, in which are kept the name, age, residence, and date of first employment of all persons employed in connection with the mine. These registers must be produced at the request of any provincial or district inspector, who has the privilege of copying them.

No boy under the age of sixteen is permitted to work below ground, and no boy between the ages of twelve and sixteen years is permitted to work above ground unless he can furnish a certificate from a duly qualified provincial teacher to the effect that he is able to read and write and is familiar with the rules of arithmetic as far as and including division. No woman or girl of any age is permitted to be employed in the workings of any mine.

EXCHANGES.

The South African Mining Journal, September 5, 1908.—An editorial on the outlook for the Rand is cheerfully optimistic. "A silent industrial revolution has been effected in these fields. The inefficiency, waste and extravagance that characterized the early days of every mining field have been swept away. Not only of the Rand, as they characterized the early days has a striking reduction in costs been achieved, but things have been put in trim for a still further reduction." One of the leading mining firms has appointed as its adviser a consulting engineer whose experience has been confined to the organization and operation of Welsh coal mines, "where the saving of a fraction of a penny per ton is a matter of infinite pains and moments." This is taken as a promising sign.

The Mining World, October 10, 1908.—The first of a series of articles on "Some of the Large Stamp Mills of the World" appears in this number of our contemporary. C. C. Christensen is the author. The Alaska Treadwell and the Alaska Mexican mills are the subjects of this installment. In the 300-stamp mill of the Alaska Treadwell Mining Company two series of 150 stamps are arranged back to back. The stamps are grouped in double batteries of five stamps each. Wooden pulleys, 72 inches diameter by 15-inch face, keyed on the outer ends of the cam shaft, receive the power for each set.

The 1,050-lb. stamps are lifted by double cams, and drop 97 times per minute, in order 1, 3, 5, 4, 2, crushing an average in a year's run 5½ tons ore per stamp per 24 hours.

Steel shoes, heads, tappets, and cams are used. Iron dies are made in the company's foundry. One pound of chrome and Koppel steel in the shoes will crush about 3 tons of ore, and one pound of iron in the dies will crush about 4.4 tons.

The Iron and Coal Trades Review, October 9, 1908.—The current number of the Review demonstrates the probability of the development of an English market for French Lorraine iron ores. The export of this ore is a necessary feature at the present stage of France's coal production. France is quite unable to use all of her own iron ore output. Great Britain should be a purchaser in the near future.

The Mexican Mining Journal, October, 1908.—This number of our excellent southern contemporary contains a short paper on cyanide practice at Pachuca. The author, Mr. E. O. Daue, brings out several useful points. Cyanide practice at Pachuca has not become uniform enough to be described as typical of the district. On many points there are still divergences. At the Hacienda Lorato the ore, consisting approximately of 75% quartz, 5% alumina, 5% calcite, with some pyrite and a little pyrolusite, and containing 1.1 kilos silver per metric ton, is crushed to about 1½ inch ring by four 7x10 Blake crushers. In the stamp mill the ore is crushed through a 16-mesh screen in a 0.02 to 0.04 % cyanide solution. The stamp mill consists of twenty 1,050-lb. stamps, dropping 106 per minute. The pulp passes to 8 Wilfley tables, and the taling from these tables to a series of 14 Pachuca chain mills. The mills grind the pulp to 40-mesh, and are supplied with additional coarse ore up to their capacity. The coarse ore prevents sliming, and increases the capacity of the mills. From the mills the pulp passes to a series of cones, the overflow going to a series of Johnston tables and the underflow to another series of the same tables. There are 38 of these tables in all. The tailing is elevated to two Dorr classifiers, where the sand and slime are separated. The slime flows directly to cyanide tanks; the sand is re-ground in three tube mills and returned to the classifiers. The pulp fed to the cyanide plant gave the following results:—

Remaining in 100 mesh...	5.1%	— 607	—3.0
Remaining in 120 mesh...	20.6%	— 641	—3.0
Remaining in 200 mesh...	29.3%	— 718	—3.0
Remaining in 200 mesh...	36.0%	—1.082	—5.5

The theoretical extraction on this plant is 87%.

At the Hacienda, San Francisco, the Brown system of air agitation is in use. Here the extraction is about 90%.

PERSONAL AND GENERAL.

List of members elected at Council meeting, held October 10th, 1908:—

Members—Roger Beck, Swansea, South Wales, Eng.; W. Chas. Carter, care Dominion Iron & Steel Co., Ltd., Sydney, N.S.; Norman R. Fisher, B.Sc., M.E., Cobalt, Ont; H. L. Kerr, 68 Admiral Road, Toronto, Ont.; J. W. Powell, Coleman, Alta.; Dolph Rosewarne, M.E., care Mr. Cecil M. Bryant, Vancouver, B.C.; L. R. Symmes, Giroux Lakes, Ont.

Associates—K. C. Allen, care Le Roi Mining Co., Ltd., Rossland, B.C.; Alex. M. Bilsky, Cobalt, Ont.; Sydney Smith, General Manager Duchess Silver Mining Co., Ltd., Cobalt, Ont.; Milton Steindler, care Kerr Lake Mine, Cobalt, Ont.; Alfred J. Young, North Bay, Ont.

Student—Athur F. Braid, Sewaren, N.J., U.S.A.

The death is announced of Mr. Bennett H. Brough, Secretary of the Iron and Steel Institute. Mr. Brough died on Saturday, October 3rd, at Newcastle-on-Tyne.

Mr. Brough was born 48 years ago. His technical education was gained on the Continent and in England. In 1886 he was appointed instructor in mine surveying at the Royal School of Mines. Seven years later he accepted the secretaryship of the Iron and Steel Institute. Mr. Brough's best known work is his textbook on mine-surveying. This volume, now in its twelfth edition, is widely used. Of his other important contributions to mining literature there is not space for detailed mention. It is sufficient to say that he was a vigorous and well-informed writer. His services were in constant demand, both as a contributor to the press and as an organizer.

INDUSTRIAL PAGE.

WAY'S POCKET SMELTER.

In California there is a company manufacturing a pocket smelter for testing ores, which is proving a success. Way's Pocket Smelter Company, of South Pasadena, California, are marketing this useful outfit, which consists of a small tablet about the size of an ordinary playing domino, one side of which is liberally indented.

In composition it is carbon, subjected to a mechanical treatment which gives it a fluxing and reducing quality, rendering it highly combustible. This tablet furnishes the necessary furnace, heat, and crucible without, apparently, containing either. Tests are made by pulverizing the ore in a small iron mortar, furnished with the outfit. The finely powdered ore is then spread evenly over the tablet, and when a match is applied burns rapidly, leaving a tablet the same shape and size, apparently of charcoal. The ore, however, is reduced, and is in the burned tablet, in a finely divided metallic condition. This burned tablet is then put in the glass mortar, thoroughly ground and "panned." If there is any metal in the rock it will be plainly visible against the dark green glass of the mortar. The smelter will reduce to a metallic state ores containing gold, silver, patinum, copper, tin, lead, bismuth, zinc, etc., and will enable the prospector to quickly determine whether or not any rock carries "values." This simple device will enable one to readily ascertain by reliable test the contents of any rock.

With Way's pocket smelter and a few simple tools in his kit the prospector, or anyone with an observant eye, is completely equipped for the discovery of valuable metals. The complete pocket smelter outfit, ready for use in the field, contains everything necessary (except acid, which can be procured anywhere) for immediate utilization. It contains one box of smelters (30 tests); one iron mortar and pestle (special design); one green glass mortar and pestle; one patented dropping bottle and case; one double lens magnifying glass; one 40-mesh screen; magnet, and complete instructions. This outfit, securely packed, sells for $5.00. A smaller outfit is also put up, which consists of one box of smelters; one patent dropping bottle and case; one iron and one green glass mortar, and complete instructions, for $3.50. With the use of Way's pocket smelter you can accurately determine, on the ground, the metal contents of any ore at a cost of only 5 cents for each test. The manufacturers find that about 75 per cent. of their sales are made to mining companies. Inquiring into the matter, they ascertained that the mining companies make preliminary tests at the mine on ores, and send only those which show values to be assayed. This saves the mining companies considerable money in the course of a year. By writing Way's Pocket Smelter Company, Box 945, South Pasadena, California, you can get a free copy of the "Prospector's Friend," a valuable booklet, which explains in detail the pocket smelter outfit and other valuable information for mining men and prospectors.

Franklin Air Compressors, Catalogue No. 26, Chicago Pneumatic Tool Company, Chicago.—Frank compressors are built in more than one hundred sizes and styles, to suit all purposes from motor hoists to pumping natural gas. In design these compressors follow the most approved steam engine practice, working along original lines only in details vital to economical air compression. The catalogue before us illustrates all essential varieties.

J Edition, Catalogue of W. F. Stanley & Company, Surveying, Engineering, and Mathematical Instruments, 286 High Holborn, London, W.—In this well-prepared catalogue, amongst a complete range of surveying and engineering instruments, illustrations are shown of several complete mine surveying outfits. The Stanley instruments have a world-wide reputation.

Ackroyd & Best's Safety Lamps are described in a recently issued catalogue. Many advantages are claimed for this make of safety lamp. It need not be lighted until it is actually needed. Lighting takes but a few seconds. Underground re-lighters are supplied whereby a lost flame can be replaced quickly and safely. The lamp can be cleaned rapidly, filled expeditiously and cleanly. It can be opened only by means of a powerful electro-magnet.

Messrs. Ackroyd & Best have introduced a Maintenance Contract System, under which they supply

their patent lamps, together with lamp-room igniting and magnetic unlocking apparatus, oil filling machine, one safety underground re-lighter for each 100 lamps, together with oil having flash point of at least 250° as required for working single shifts, wicks, and renewals; for a small weekly sum, payable monthly.

Colorado Iron Works Company, Denver, U.S.A., Catalogue No. 10 B., Cyanide Plants, Machinery, Tanks, and Appliances.—The modern trade catalogue is often quite as instructive and, not seldom, much more interesting than the usual text-book. Catalogue 10 B is one of the best conceived that we have seen in a long time.

The catalogue proper is preceded by a short description of the cyanide process, which is clear, concise, complete, and suitably illustrated. In fact, this preliminary treatise should prove most instructive to anyone interested in gold milling. The catalogue includes ample descriptions of all cyanide plant accessories.

The Hill Clutch Company, Cleveland, Ohio, have published an illustrated catalogue dealing with their collar oiling bearing and the various attachments. Full specifications are included. The Hill Patent Collar Oiling Bearing is so constructed that it will not leak nor will the oil creep along the shaft. There is no waste of oil. It operates for months with one filling.

Wire Ropes.—This is the title of an attractive catalogue issued by **W. B. Brown & Co. (Bankhall), Limited,** whose head office is 63 new Broad Street, London, E.C. W. B. Brown & Co. are manufacturers of steel wire ropes and cables for mining, aerial cableways, tramways, suspension bridges, shipping, and all engineering purposes.

In the construction of their steel ropes W. B. Brown & Co. exercise the most minute care. The material is selected after close inspection. Every wire used is tested for breaking strain, elongation, torsion, and flexion, and a record is kept of the wire retained for manufacture. Regularity and evenness of the material used is thereby ensured. The history of tests performed on each rope is kept on record, and is always open for reference. This makes possible an exact repeat order, and buyers can depend upon getting at any time a repeat rope of exactly the same quality as its predecessor.

The catalogue contains useful information concerning the handling and care of ropes. Full specifications of sizes and grades are given, together with tables for determining the diameter of rope suitable for given loads. Many incidental attachments are illustrated. An ordering telegraph code is appended.

Bulletin No. 1428, received from the Allis-Chalmers Company, Milwaukee, is an article on the Allis-Chalmers hydraulically operated copper converters, reprinted from the Mining and Scientific Press. It describes an installation of two hydraulically operated stands and eight shells, 96 inches by 150 inches long. Each converter of these dimensions, assuming six charges per stand per 24 hours, and 26 working days per month, has a capacity of about 1,250,000 lbs. copper per month. The tuyere arrangement is especially to be commended.

Special Publication No. 7061. Canadian Westinghouse Company, Limited, Hamilton, Ont.—The Baldwin-Westinghouse electric locomotion for mining and industrial traction are here well described. The co-operation of the Baldwin Locomotion Works with the Canadian Westinghouse Company is a guarantee of the best modern locomotion design along with the electrical equipment. Electric haulage is clean and economical. By its use fire risks are removed in working around inflammable material. This catalogue sets forth the subject completely.

Perforated Metal, Bulletin 1425, Allis-Chalmers Company, Montreal.—The Allis-Chalmers people outline in this bulletin a few of their ranges of perforated sheet metal. Mining screens, grizzleys, screen plates, separators for coal, ore, phosphates, etc., are included. Full directions as to ordering are presented on the third page.

The Lea-Degen High-Duty Turbine Pump, Bulletin G, The Lea Equipment Company.—The Lea-Degen high-duty turbine pump is built in separable unite, and is parted both horizontally and vertically. These parts can be assembled rapidly and re-assembled in any desired combination. The trouble of packing is done away with entirely by means of right-angle cup-leathers, held in place by springs in such a manner that they are tight under all conditions. They allow the shaft to oscillate throughout any distance necessary, and are quickly renewable. Another most important point is that both suction and discharge are placed below the centre line of the pump, allowing removal of top without breaking water connections. Bearings are all of a self-oiled type. There are many other points of interest.

The City of Cobalt Mining Co. and the Temiskaming Mining Co., Ltd., have recently ordered air compressors for their properties in the Cobalt district, which represent a considerable step forward in the type of power machinery used in that camp.

These machines are of the Corliss tandem compound steam and two-stage air pattern, manufactured at Chicago by the Sullivan Machinery Company. Most of the air compressors now in service in the Northern Ontario district have been selected with a view to low first cost, since the mines have hitherto been in a stage of exploration, rather than of permanent production. These compressors, while performing well the purpose for which they were designed, have not been of a type economical in power consumption.

Fuel at Cobalt is expensive, owing to the long distance of the district from coal fields, and of the difficulty of hauling it from the railroad to the mines. The two Sullivan compressors just ordered are especially designed to secure a high degree of steam economy at a moderate first cost, with low expense for foundations and house-room.

PRESERVATION OF WIRE ROPE.

Where wire ropes are worked in places where they come in contact with acid water, or in hot and wet shafts, it is found that galvanized wire, of as large gauge is practicable, fills the requirements best. Before the ropes are used they should be coated thoroughly with a suitable lubricant applied hot. Cold lubricants are of little use. In the absence of lubricants the ropes rust out much more rapidly than they would wear out normally.

SPECIAL CORRESPONDENCE

Glace Bay, Oct. 19th, 1908.—The members of the P. W. A., who have left that body and joined the U. M. W. A., think they should have some share of the Defence Fund of the local organization, and they obtained an injunction restraining the Grand Officers of the P. W. A. from acting in that capacity until the claim of the U. M. W. A. faction is decided by the law courts. The case has been tried before Judge Graham at Sydney, who reserved his decision, and granted a continuance of the injunction until his decision is given. Somehow or other a political twist has been given to the internecine warfare between the unionists, and Mr. Justice Graham will very likely reserve his decision until after the election pother has subsided and reason resumes her sway.

The late strike of the C.P.R. employees has been an object lesson in the futility of strikes in Canada when engineered in the States. The sympathy of the Canadian public never will be with any body of workmen who strike at the dictation of international labor unions, and it cannot be gainsaid that public sympathy is the one and only force that will enable any labor union to win a strike. There have been very few strikes that have had less justification than the C. P. R. strike. It was deliberately called at the moment when it was most calculated to disorganize the carrying trade of the Dominion, with an utter disregard of public convenience. In direct consequence of this alienation of public sympathy, we believe, the strike failed in the most abject manner. The same abject failure, it may safely be prophesied, will attend any and every attempt to apply the methods of American trade unionism in Canada.

In our last letter we referred to the supreme importance of the St. Lawrence trade to the coal industry of Cape Breton, and to the very narrow margin by which this market is saved to Canadian operators. The people of Nova Scotia, if their would-be parliamentary representatives and their newspapers are any guide, do not realize these facts. Both political parties seem to be making a dead set at the coal trade. It is surprising how little some people recognize the hand that feeds them, and how lightly they discuss legislation on matters of which they are usually entirely ignorant. The representatives of one party wish to impose upon the coal trade an Eight Hour Bill, similar to that freak of class legislation shortly to occupy the attention of the House of Lords in England. The other party is blethering about Norwegian shipping in Canadian coastal waters, and the alleged extortionate price of coal. The newspapers who excite themselves over these Frankensteins of their own imagination usually refer to the coal operators as "barons." Exactly why nobody knows, but it sounds well, and all these papers have a penchant for a gentleman who was called Munchausen.

As to the selling price of coal. When it is considered that the miners of Cape Breton earn possibly as high wages as are paid to coal miners in any country, where the conditions of living approach the normal, and that coal is sold in Nova Scotia at a cheaper rate than in any European country, we fail to see where the extortion and injustice appear. The coal mines of Cape Breton are distant from Halifax almost twice as far as the mines of Derbyshire are from London, yet coal is cheaper in Halifax than in London.

The extortions of the coal "barons," which, according to the jeremaids of the newspapers, are wrung from the withers of the people, are so large that not a single coal company in Nova Scotia is really paying. The largest of them all, the Dominion Coal Company, has not paid one per cent. on its capital, reckoned from incorporation to date. Another large company has just passed its dividend, and one, at least, of the smaller companies is in the hands of the sheriff. But they have paid by far the largest portion of the provincial revenue, and they have supported at least one-quarter of the whole population of the Province. Even coal companies have their little uses.

The extraordinary attitude of one newspaper is well instanced by its conduct on two different occasions. Three men were killed at a Nova Scotian mine, directly through the negligence of a fellow-workman. This newspaper asked the Attorney-General to take steps to arrest the president of the company for manslaughter before he absconded! Another company, at very considerable expense, equips its mine with the latest appliances for saving life and property, and is able to render valuable assistance to a neighbor. This newspaper studiously avoids any mention of these facts. And this attitude is typical. Anything that can be raked up against the large coal operators is heralded abroad with colored headings, and anything that would tend to show a spark of saving grace is studiously suppressed.

Whole sheets are being written about the woes of schooner captains, whose distresses are stated to be entirely due to the growth of Norwegian shipping. All of this touching editorial solicitude for the poor schooner captain is so much politics. We can pass this phase, for it is evanescent.

What is the truth about Norwegian competition and the schooner trade? First of all, sailing vessels are out of date, and only exist to-day on sufferance. Steamers, large and small, are gradually ousting the schooner. The Norwegian vessels are up to date. These people have captured a large slice of the coastal trade, because they have been sufficiently enterprising and farsighted to build just that particular type of boat that will give the quickest despatch and the lowest freighting costs. The Norwegian is a born sailor, and does not, even in these modern days, belie the Viking's blood. The mate of a Norwegian ship may look like the deckhand of a British tramp steamer, and he certainly works like one, but his conversation is that of an educated gentleman. It is said that the Norwegian sailor lives on food that any proper-minded British citizen would refuse. The writer recently sampled the menu of both an English and a Norwegian ship, and preferred the latter. The whole reason for the growth of Norwegian shipping is that the Norwegian captain knows his business, is a fearless navigator, and his ship is built to suit the trade in which it is to be engaged. All the Norwegian ships that sail Canadian waters were built, not in Norway, but in England. The cantilever patent on which many of them are constructed, is the property of a Tyneside firm. They pay fair dividends to the shareholders in Norway. But we cannot see how the exclusion of Norwegian vessels is going to help the schooner captain. It is a little late in the day to freight coal up the St. Lawrence in schooners, and if the Norwegians go, British bottoms will replace them. There are no Canadian ships capable of handling the coastal trade at the present time, and where it will advantage the country to force a shipbuilding industry by killing the coal industry, it is rather difficult to see. It is said that schooners cannot get cargo, because they are forestalled by the larger ships. There is a pier at Glace Bay which does nothing else but load schooners with coal all day long, and the Dominion Coal Company run an advertisement through the newspapers asking for schooners to load coal in any quantity.

A most interesting and valuable contribution has been made to industrial and sociological literature by a work, entitled "Diseases of Occupation," from the pen of Dr. Thomas Oliver, of Durham University. Dr. Oliver is well-known in connection with his labors for the British Home Office, and the present work deals thoroughly with every phase of industrial disease, from "a legislative, social and medical point of view," as the sub-title of the book states. The work is written so that it can be read and appreciated by those who are not medical men, but who happen to be associated with the industries that Dr. Oliver passes under review. Great interest centres around literature of this

kind in view of the present trend of legislation, particularly in respect to the various laws that propose the shortening of hours of labor and the compensation of industrial victims. Dr. Oliver deals squarely and impartially with both the responsibilities of the employer and the employed. A few extracts from Dr. Oliver's treatise may not be without interest to the readers of the Journal, as they relate to mining and miner's diseases.

Regarding the much-debated question of the general health of coal miners Dr. Oliver says: "Of all occupations, none is more hereditary than that of coal mining. A lad goes into the mine because his father is working there and his grandfather did so before him. Miners are, therefore, not a selected class of men. Although a large part of the day is spent underground, the occupation of the miner is not an unhealthy one. . . . When pulmonary tuberculosis is caught by a miner, it is much more likely that the infection has been caught in the home or public-house than in the pit, where the ventilation is ramarkably free and the air supplied particularly pure and abundant. Better housing, the provision of purer drinking water, better food, good wages, greater railway facilities, and the establishment of reading and recreation rooms have done much to improve the health of the mining classes, and to raise their tone socially and morally."

On the question of whether coal-dust is or is not antiseptic the book goes on to say: "Experimental results, also surgical experience of miners' accidents, have suggested that coal-dust possesses a distinctly germicidal action, but when this has been tested on various forms of micro-organisms, including tubercle bacilli, no such germicidal action has been found." Dr. Oliver is of the opinion that the improved health of the miner and his comparative freedom from pulmonary tuberculosis are due to the better ventilation of the coal mines, the air of which, as it passes onwards through the mine, "becomes rid of bacteria and reaches the miner at his work in a purer state than the air we breathe in the streets of a large town."

Some of the miners' diseases to which the treatise refers are more particularly incidental to longwall and hand pick mining in thin seams, where the constrained and unnatural position of the miner induce such conditions as "beat knee," and "miners' nystagmus." The introduction of machinery, such as coal-cutters and longwall conveyors, is likely to render many of these conditions less frequent in the coal seams of the Old World, and on this side the water we have not yet got down to the working of the thinner seams.

Dr. Oliver refers to the unpleasant consequences that may follow the neglect of purulent opthalmia, or trachoma, in mining districts, and speaks of the spread of the disease to the wives and families of miners in Westphalia. Referring to the possibility of the introduction of this disease into Britain, Dr. Oliver says it can only arise "through alien immigrants bringing it." It is a matter of congratulation that the Canadian authorities are rigorous in this matter, but nevertheless we have reason to know that there are many cases of this disease amongst the mining populations of this country

Judging from Dr. Oliver's description the conditions of the gold workers in the Rand shows more need for improvement than any other set of mining conditions that exist in the Empire. It would be hard to imagine a worse state of affairs than have existed in South Africa, and although some improvement is taking place it is very slow.

A very complete chapter is devoted to amkylostomiasis, in which we are glad to find Dr. Oliver believes that solutions of common salt are of great value in preventing the development of the ova of the parasite to the larval stage. In most of the Cape Breton mines that underlie the sea there is present mine water of a more or less saline nature. Dr. Oliver states that the points which have struck him in regard to ankylostomiasis are: "The silent march of the disease from mine to mine and from one mining centre to another, the long latent period of its incubation, the suddenness of its outbursts, and the extreme virulence of the endemic when it first appears compared with what it is later on."

The last chapter in the book is devoted to the consideration of rescue work in mines. Dr. Oliver lays stress upon the fact that by far the greater number of victims in mine explosions die from carbon monoxide poisoning, and not from the shattering and burning effects of the explosion. He reviews the various forms of rescue apparatus now on the market, and closes with the remark that any doubts as to the utility of rescue apparatus should be removed in view of the following: "On September 14th, 1907, an explosion occurred in the Saar and Mosel Colliery at Merlbach, in the Prussian Saar district. A rescue party of 12 men, equipped with the Draeger apparatus, descended, and after working for an hour, brought to the surface the eight survivors and the bodies of four men who had been killed by the explosion." Dr. Oliver also remarks that the subject is one to which medical men engaged in colliery practice should give attention.

On the subject of intemperance Dr. Oliver does not mince his words. To quote: "There is nothing that induces to certain forms of industrial poisoning, or is more likely to become a source of accident to a workman than indulgence in alcohol . . . to this cause may be traced many of the accidents that happen in docks and wharves, and to it, also, probably some of the shipwrecks that have taken place shortly after vessels have put to sea. . . . It is not improbable that many of the unexplained falls of men, which may result in serious injury to life and limb, may be the result of ill-nourished, poisoned conditions of the nervous system, not the outcome of an immediate debauch, but of the long continued indulgence in alcohol. If we add to alcohol the infection of syphilis we have in these a combination of circumstances, the influence of which, from a medico-legal point of view, is far-reaching, so far as workmen's compensation is concerned."

It is a pleasant feature of this work that many of the diseases which Dr. Oliver has to refer to have been mitigated by improved conditions and industrial legislation. There are still many crying evils connected with child and female labor that require removing, both in America and in Europe, but on the whole, the book is one that makes for optimism, and is a strong plea for mutual consideration between capital and labor.

Diseases of Occupation, from the Legislative, Social and Medical Points of View. By Thomas Oliver, M.D., F.R.C.P. Methven & Co., London. Price, 10s. 6d.

ONTARIO.

Cobalt.

The Leasing System of Cobalt.—The Leasing System, which is rapidly gaining favor in the camp, will do much to solve the problem of the development of the large area in the proven district held by individuals or companies without funds to run their properties.

This system, which is universal in Western camps, was introduced in Cobalt by the Peterson Lake Mining Company, which now has a number of 10x20 acre plots leased to various companies and syndicates.

The Nova Scotia Company are now taking high grade ore from a plot leased to them by the Peterson Lake Company. The Little Nipissing is working a very promising lease situated on the east shore of the lake. Segsworth & Jackman, The Kerry Mining Company, The Gould Syndicate, and The Bridge Syndicate are all operating properties leased from the Peterson Lake Company.

A syndicate of Montreal capitalists, represented in Cobalt by A. M. Bilsky, have secured a number of important leases, and are negotiating for others.

Two twenty-acre lots north of and adjoining the Shamrock, Badger and Fisher-Eplett, owned by the Davis Silver Cobalt Mines Company, have been leased to this syndicate, which also has leased the Silver Mountain and Silver Nugget properties.

Mr. L. D. Madden, who has been a strong advocate of this method of development, in addition to arranging the Little Nipissing lease, has secured a ten-year lease from the Coleman Cobalt Company of a forty-acre plot, which adjoins the Nipissing Silver Leaf and White Silver, upon which he has already made a very promising discovery. Mr. H. P. Davis, in conjunction with one of the members of the syndicate which controls the Davis Silver Cobalt Mining Company, has taken a lease on Lot 5 of this company, and is working a large force of men. Mr. Davis is also negotiating leases in two additional properties belonging to the same company. The majority of these leases are for five years, with a royalty of 25 per cent. of the net smelter returns.

Nova Scotia.—After many months of development work carried on under more or less discouraging circumstances the Nova Scotia Mine is in a very favorable condition for steady shipments of very rich ore.

While many pockets of high grade ore were located in the 1,800 to 2,000 feet of underground work, no permanent ore bodies were located until this spring. The present position of this mine, as one of the big shippers is due to the efficient management and the continued faith of the directors in the property.

In the early part of this year in a cross-cut at the 100-foot level, vein No. 3, a very wide body of high-grade ore was encountered. A drift 200 feet in length, extending into the 30-acre tract, leased by this company from the Peterson Lake Mining Company, has developed a continuous ore body from 5 to 15 feet in width in which the values occur as leaf silver shot through the ore chute. A winze sunk on this chute proves the continuance of the values to this depth, and there should be 50 feet of good stoping ground above the 100-foot level. 100-foot level.

The last report of Mr. Benj. B. Lawrence, consulting engineer for the Nova Scotia Company, gives a concise and clear statement of the physical condition of the property, which should inspire the confidence of the stockholders in the management and the future of the mine.

Approximately $75,000 has been invested in surface plant and buildings, with the result that this property is one of the best equipped in the district. A comprehensive system of handling and tractment of the ore has been worked out, and from present indications, this mine should soon rate as one of the important shippers of the camp.

Northern Customs Concentrator.—Under the efficient management of Mr. F. J. Bourne, the Northern Customs Concentrator, is successfully handling on an average of 85 tons of low grade ore per day.

Over 4,500 tons of ore from the dumps of the Silver Queen, Townsite, City of Cobalt Mines have been treated since July, when operations were started. The mill runs 24 hours per day and only five and one-half hours have been lost in this time.

A self-dumping skip carries ore to a No. 4 Gates gyratory crusher, which reduces the rock to 1½-inch mesh, from the crusher it goes to a pair of 16" x 24" rolls, and is crushed to a ¾ inch size, elevated to a 36 by 60-inch trommel, and then separated; the over size is treated on a 24 x 30 Bull Jig, the tailings being sent to a battery of twenty 1,250-pound stamps, which reduce the materials to a pulp.

The pulp is taken to two Richard Classifiers, the coarse material going to Wilfley tables, and the overflow to callow settling tanks. The material from these tanks is treated on 5 by 6 Frue Vanners.

The rock handled by this mill is chiefly the dumps from the various mines, which have contracts with the Northern Concentrator Company, and averages 30 ounces of silver to the ton.

The recovery is approximately 84 per cent. Ore as low as 10 ounces to the ton can be handled at a profit.

Mr. Bourne is now installing an amalgamating and cyaniding process to save the small percentage of silver which is lost in the mill.

The mill is saving a large percentage of the argentite and pyrargrite by taking it out as a hutch product on the jig. This is re-treated in Keivies, or half barrels, and brought up to about 1,100 ounces silver. The losses in argentine and pyrargyrite are largely due to slimes. By treating in Keivies the losses due to attrition in jigs is avoided.

Cobalt Central.—On October 22nd a diamond drill which has been operating for some days at the Cobalt Central property, located at the two hundred-foot level a two-foot vein of calcite, smaltite and silver, which assays about six hundred ounces. A cross-cut will be run from the main drift at the lower level to cut this vein.

Chambers Ferland.—The "Right of Way," "La Rose" vein, was located on the Chambers Ferland property on October 20th, in a cross-cut from the "Right of Way" drift. This cross-cut was run at the expense of the Chambers Ferland Company to locate this vein on their property. The ore, were encountered, was forty-five inches wide and was very rich in silver.

Montreal River.—A contract has been let and work begun on a road from Elk City to Miller Lake. This road will be twenty-five miles in length and wil open up the Miller Lake, Lost Lake and Gowganda Districts.

Queen Alexandra.—A contract has been let to sink a shaft fifty feet deep on the Queen Alexandra property on the north shore of Cross Lake.

Coniagas.—The regular quarterly dividend of 3 per cent. will be paid November 2nd to shareholders of record of October 20th.

Little Nipissing.—At the annual meeting of the Little Nipissing Mining Company, held in Toronto, October 16th, it was unanimously agreed to increase the capitalization of the company from $650,000 to $1,000,000. The 350,000 shares were underwritten by the shareholders.

The report of Superintendent Madden, who has had charge of the development of the various properties of the company, was most encouraging.

The recent discovery of a 12-inch vein of decomposed calcite and cobalite near the north boundary line of J. B. 2, the orinal property of the Little Nipissing Company, is very promising, and has very good prospects of proving up shipping values.

Silver Leaf.—At a meeting of the directors of the Silver Leaf Mining Company in Toronto, October 17th, it was agreed to cancel the lease under which Mr. H. D. Symmes has been operating the property for the past year. The lase expires on October 21st, and after that date the property will be under the management of Mr. George Leyson, formerly superintendent of the Silver Queen.

Mr. Leyson will take charge under very much more favorable circumstances than confronted Mr. Symmes a year ago.

The company now has nearly $100,000 in the treasury, and ore in sight in the No. 5 vein, upon which a shaft has been sunk to the depth of 215 feet.

Temiskaming Cobalt (Warner Property).—A syndicate of Chicago people has purchased the Warner or Temiskaming Cobalt property on the shore of Lake Temiskaming, south of Haileybury.

Several shipments of ore, which run very high in cobalt, have been made from this property. A shaft has been sunk 125 feet on a big vein of cobalt. A new plant, consisting of a 12 inch drill compresser, boilers, etc., will be installed at once.

Cochrane Cobalt.—Under the direction of Mr. Floyd Harmon, operations have commenced on the Cochrane Cobalt property, south of the Temiskaming.

Columbus Cobalt.—A contract has been let to sink the main shaft on the Columbus Cobalt an additional 50 feet to the 200-foot level.

Leases.—Lots No. 388 and 389 an dthe Station Grounds at Cobalt, a total of 16 acres, have been leased from the T. & N. O. R. R. by A. Rosenthal and G. B. Dickson, of Ottawa.

The Davis Silver Cobalt Mines Co. have leased a twenty ore lot, south of Cross Lake, to a Montreal syndicate.

BRITISH COLUMBIA.

Phoenix.

Former Manager P. F. Roosa, of the Dominion Copper Co., has been appointed provisional liquidator for the purpose of winding up the affairs of that concern. It is regrettable that this company found it impossible to raise the money to pay the $80,000 that was due the bondholders for interest and payment toward the sinking fund, but it is conceded that the company would have, at best, worked along in a half-hearted way as long as copper remained at its present low figure, and, perhaps, after going through the fire of reorganization the affairs of the company will be in a more pure condition, and their finances will be placed on a firmer basis. The mines of the Dominion Copper Co. are looking well, and they had got their mining and smeltnig costs down to a lower figure lately than they have hitherto been able to do. It is true that there are a few facilities that might be installed at the mines and smelter, and which would materially reduce the cost of mining and smelting, but the management had long recognized this and these appliances would now be installed if they had ben able to find the money to do the work. A greater part of the equipment is up-to-date, such as air-compressors, drills, larger furnaces at the smelter, etc. No doubt when the present difficulties have been arranged the company will resume work with the prices of metals ascending, and as they will, no doubt, get a substantial start, the company should rapidly arive at a profit-paying stage and rank with the other dividend paying low-grade copper mines now working in the Boundary district If it is possible those interested are going to resume work within the next few weeks, but it is hardly likely that they will get matters in proper form in such a short space of time Some of the men have not been paid their wages yet, having only received time checks for their time; the principal issue at this moment is to get these men paid up. A small crew has been retained around the mines and smelter, to keep the mines unwatered, etc.

The unsettled condition of Dominion Copper affairs has, to a more or less extent, affected all of the mining interests of this district, which is only natural, and the result can be seen in the ore shipment during the past four weeks, which have shown a steady decline in tonnage, with the exception of the last week, ending October 17th, when the increase of 2,501 tons over the preceding week is recorded. The total tonnage for that week being 30,301 tons. Shipments from the Mother Lode, and particularly from the Oro Denoro, have been somewhat arratic during the last few weeks. Shipments from the Snowshoe have been steady, and during the week ending October 10th ran up to 2,730 tons.

The management of the Jewel mine have got the new site for the stamp mill cleared, and the ground is ready for the foundation of the building. There is a large tonnage of concentrating ore in the Jewel mine, but it is of a recalcitrant character. However, after a number of tests the company is satisfied the method they will employ in the new mill will be a success.

The bond until recently held by Hedley mining men on the Golden Zone has been thrown up, and it is stated that the deal will not be put through. From lack of water the recently installed stamp mill is now inoperative.

The Granby report is to hand, and shows that their profits for the fiscal year, ending June 30th, 1908, were $354,424 on a gross earning of $3,790,184. This company realized an average price of 13 1-3c. per lb. on fine copper during the year, while the net cost per pound, after deducting values of gold and silver, was $131. It is shown that the average extraction per ton of ore was 23.42 lb. copper, .2865 oz. silver and .0454 oz. gold.

A force of eight men has been put to work on the recently acquired B. C. Copper property in Wellington camp The 35-ft. shaft is all in ore, and is looking richer with ever shot fired, all of which must be very gratifying to both the bondholders and the bondors.

A new land of high grade ore has been cut in the workings of the Sally mine.

Rossland.

The report of the Consolidated Mining and Smelting Co. of Canada, Limited, has been published here, and is regarded as a good report for a year into which so much trouble was crowded as that which the report covers. Naturally, if the metal market had not gone to pieces last year the Consolidated Co. would have made nearly $400,000 more in selling the large quantity of custom ore and ore from their own mines that they had on hand at that time. As it was the profits on the year's operations were $43,415.93. This concern paid $66,940 in dividends during the year, and wrote off a large amount for depreciation of plant, stores, equipment and doubtful bills. It is pleasing to note that operations at the Trail smelter and lead refinery were increased 45 per cent. during the year, the value of the output being $5,425,501, as against $3,786,146 for the year 1907. According to the report (and according to local reports) the mines have large reserves of ore, development work is in good condition and the future looks bright.

The lessees of the Evening Star have uncovered a new ledge from which they aer shipping some rich ore. Assays recently taken show values of $28 to $50 per ton. The lessees shipped a 35-ton car during the week ending October 10th.

The lessees of the Nest Egg got a car of select ore off to the smelter during the last week, placing that mine on the shipping list for the first time this year.

Active work is going on at the Centre Star, Le Roi, Le Roi 2, Limited, Giant California, and many of the smaller properties, and the situation here presents a very stable appearance.

Nelson.

At the Spokane Interstate Exposition, October 5th to October 10th, the Nelson Board of Trade, competing with Montana, Idaho and Washington was successful in taking the $100 trophy cup for a general ore display. Nelsonians generally feel proud of this achievement, but there were other sections of British Columbia honored with cups and some with diplomas. The following were granted cups for their ore displays: Similkameen, Columbia Copper Mining Co.; Kamloops, Iron Mask mine; Boundary, Ore Denore of B. C. Copper Co.; Rossland, Centre Star mine; Nelson, Queen Victoria mine; Ainsworth, Krao mine; Kaslo-Slocan, B. C. Standard; one cup being awarded each display deserving of this honor in any one section. Montana, Idaho and Washington mines also competed in this class and carried off nine of the sixteen that were to be alloted. The following British Columbia mines were awarded diplomas: Lucky Strike, Kamloops; Evening Star, Kamloops; Roach River group, Similkameen; Elkhorn, Boundary; Arlington, Nelson; Granite Poorman, Nelson; Blue Bird, Kaslo-Slocan; Blue Bell, Ainsworth; Broadview and Mammoth, Camborne, from which it will be seen that our mines also took ten of the 22 diplomas that were awarded.

The talk of the Slocan is the strike that the Italian lessees of the Reco have made. They have more ore than they can conveniently handle with existing facilities. These fortunate men have been offered $25,000 for their lease, but refused to sell. A couple of strikes of this character and Sandon will take on some of its old-time liveliness.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax.—The Waverley plant of the Acadia Powder Company has been purchased by the Nobels. This is a significant step, and, no doubt, indicates an expansion of the industry.

Halifax.—Three new gold-mining enterprises will be launched this autumn, and three abandoned mines will be put in commission.

Amherst.—The new bankhead of the Maritime Coal, Railway and Power Company has a capacity of 1,500 tons per day. It is equipped with revolving tipples, automatic quick-weighing hoppers, etc.

ONTARIO.

Cobalt.—The results of the tenders for the four parcels of Cobalt land were announced on October 15th by the T. & N. O. Railway Commissioners. Messrs. A. Rosenthal and G. P. Dickson, of Ottawa, have secured parcels one and five, comprising sixteen acres at the Cobalt station grounds, and lots 388 and 389 of the townsite. The price paid for this was $30,200. The other two parcels, comprising about four acress of lot 44 in the town and lot 338 were secured by Messrs. W. L. Hayden and Raymond Mancha, of Detroit, for $5,575. There is a royalty of 25 per cent. on the gross output of the properties. The payments were made on a 999 years' lease.

The Floyd mine (so-called), a mere prospect, is being manipulated in Montreal. Those who think that this is a mine should come up to Cobalt and have a look for themselves.

Larder Lake.—The projected sale of the Harris-Maxwell gold mine is not yet completed. A month's test run in the stamp-mill is to be made.

Cobalt.—It is reported that a compromise has been effected between the Ontario Government and the Temiskaming and Hudson Bay Mining Company. The T. & H. B. receives patents for the property under dispute, and the Government is to be paid 15 per cent. of all smelter receipts.

The Nova Scotia mine has done about 5,000 feet of drifting, along with 2,500 feet of cross-cutting since it was opend.

Bruce Mines.—The Bruce copper mine was sold at auction early in October. The highest bidder was Mr. R. W. Leonard, of St. Catharines. Mr. Leonard's bid was $50,100. Associated with Mr. Leonard is Mr. Alexander Longwell. The Bruce mine has ample low grade ore reserves. The question of concentration has hitherto been a leading difficulty.

BRITISH COLUMBIA.

Phoenix.—P. F. Roosa, local manager of the Dominion Copper Company, has been appointed receiver. The appointment was made on the application of the National Trust Company of Toronto.

Hazelton.—Five miles below Telkwa, on the Berkley River, a four-foot seam of clean coking coal was found some weeks ago. Another seam, 8 feet thick, was discovered 1,000 feet above the first one.

Grand Forks.—No. 1 Furnace of the Granby Consolidated has been put in blast. It has been enlarged and is now four feet larger and four feet deeper than any of its companion furnaces. This change in construction is experimental. If No. 1 proves successful the other furnaces will be similarly enlarged.

Kamloops.—At the Interstate Fair at Spokane the mineral exhibit from Kamloops was one of the striking features. The specimens from the Iron Mask mine won a prize in Class 2. The prize consisted of a silver cup. A similar prize in Class 1 was awarded the display from Nelson. Other B. C. camps and mines won distinction.

Victoria.—The C. P. R. freight steamer, "Princess Ena," is carrying about 1,300 tons of copper over from Sidney Inlet mines to the Tyce Copper Company's smelter. The Tyce people have leased the Sidney Inlet mines.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Several strikes of coal miners in the South Wales coal field are reported over the questions of wage reduction, and the employment of non-unionists, and a large number of miners are out of work.

The amounts awarded for compensation under the Workmen's Compensation Act, in connection with the recent disaster at the Maypole pit, Abram, in which 75 lives were lost, will amount to a total of between £14,000 and £15,000.

A syndicate has been found for the proposed of quarrying the columnar basalt on the north coast of Antrim, Ireland, between Ballycastle and Portrush.

GERMANY.

It is reported that a large new colliery will shortly be established by Messrs. Krupp, of Essen, at Neuenkirchen, Westphalia.

The Gelsenkirchen Company propose to erect six blast furnaces and an extensive steel works, etc., at a cost of 40-000,000 marks at Roth Erda.

The death of Mr. Alexander Hilbek, one of the leading authorities on mining matters in the Rhenish-Westphalian coal field, is announced.

The Rhenish Boring Co. will immediately commence the development of 15 coal concessions on the left bank of the Rhine on the Dutch frontier.

ALGERIA.

The Ain-Arko zinc deposits, which were first worked in 1873, but subsequently abandoned, were reopened in 1904, and there is now a certainty of a large output from existing workings and good promise as regards other prospects.

SOUTH AFRICA.

The Simmer Deep mine, on the Rand, is now operated by power purchased from the Victoria Falls Power Co., which is a new departure involving the supply of electric energy from central stations on the Rand. Competition in the supplying of power for operating mines is anticipated.

The diamond-cutting and polishing industry has been started at Johannesburg on a small scale with a few experienced workers. It is intended to extend it as soon as the business has been fairly established, and to train young men in the art.

More white labor is being employed in the gold mines, the engagement of previously unskilled whites to take the place of natives having proved more successful latterly than at first. One result has been a diminution in gold thefts.

CUBA.

The gold mining industry is coming into prominence. The Holguin-Santiago Mine Co. has recently made large shipments, and has acquired new claims which show excellent prospects. Other enterprises are being undertaken in the Province of Santiago, where gold was formerly produced in paying quantities.

UNITED STATES.

It is estimated that the gold production of Rawhide, Nev., during the first year of the existence of the camp, will amount in value to about one million dollars.

The Iron River district of the Menominee Range, Mich., bids fair to prove an important source of iron ore supply. A number of new mines are in course of development and others are being opened.

The Philadelphia & Reading Coal and Iron Co. is installing rescue apparatus of the helmet type at all its collieries. The device is equipped with a tank of oxygen to last the wearer for two hours.

The Tintic Smelting Co., Utah, has closed down its plant for some weeks.

MEXICO.

A new holding company is reported in process of organization to take over the assets of the Greene Gold and Silver Co. and the Sierra Madre Land and Lumber Company, the bankruptcy of which was a serious blow to the industries of the State of Chihuahua. The Greene interests will not remain in control.

Progress in the mining industry in the State of Oaxaca is being indicated by the erection at several points of modern reduction works.

COMPANY NOTES.

The report presented at the annual general meeting of the Granby Consolidated Mining, Smelting and Power Company, Limited, held in New York in the former part of October, for the year ending June 30 last, shows that during the past year the big Boundary company made a profit of $354,424. The official figures are as follows:—

Pounds of copper	21,126,926
Ounces of silver	300,593
Ounces of gold	40,139
Gross earnings	$3,790,184
Charges, etc.	3,435,760
Net profit	354,424
Dividends	675,000
Deficit	$320,576
Previous surplus	2,775,757
Profit and loss surplus	$2,455,181

The charges as above include the following items: Making expenses at mines and smelter, freight, refining, selling and general expenses, $3,013,395; foreign ore purchased, $170,266; bonus to employees, $23,100; and allowing for depreciation, $228,999.

Crediting surplus after charges, etc., $354,424, with the $228,999 charged out for depreciation, the amount earned on the stock for the year was $583,423, or $4.32 per cent. on the $13,500,000 outstanding.

The general balance sheet for the year shows as follows:—

Assets.

Cost of land, real estate, machinery, buildings, dwellings and equipment	$15,238,437
Stocks, bonds, and bills receivable	1,008,012
Fuel and store supplies	185,324
Cash and copper	421,625
Total	$16,853,399

Liabilities.

Capital stock issued	$13,500,000
Dividends collected on liquidated shares	1,323
Accounts and bills payable	896,895
Surplus	2,455,181
Total	$16,853,399

The price realized on fine copper was on an average 13 1-3 cents per pound, and an average for gold of $20 per ounce.

The net cost of copper per pound, after deucting the gold and silver values, was 10.31 cents.

The address of President Longcloth in part runs thus: The mechanical devices now in operation, such as shafts, hoists, belt conveyers, mine cars and electric locomotives, are able to handle about 5,000 tons of ore daily. The mines shipped to the smelter during the past year a total of 858,432 tons, as against 644,549 tons during the previous year. The grade of ore mined was not as good as in the previous year, carrying about one pound less of copper and from 10 to 12 cents less per ton of ore in gold and silver.

The extraction per ton o fore on the average was 23.42 pounds copper, .2865 ounces silver, and .0503 ounces of gold during the previous year. During the summer months a lower grade ore was shipped, due to mining the glory holes on the surface, which are low-grade and which cannot be mined during the winter months. Consequently the ores will average richer in winter and spring and poorer in summer and fall. The quantity of ore developed by diamond drilling has been greater than the ore extracted.

The total tonnage of Granby and foreign ore amounted to 882,611 dry tons, as compared with 665,915 in the previous year, and there was produced 21,120,926 pounds of copper as against 16,403,497 pounds during 1906-1907.

The cost per pound of copper produced, after deucting the gold and silver values, was $0.1024 as against $0.1014 in the previous year.

Almost immediately after issuing our last annual report a most severe panic broke out, and among other disastrous consequences the consumption of all metals decreased materially, and prices showed a heavy decline. Prices fell off from about 17 cents to close to 12 cents, and showed little recovery during the first six months of the present year, due to the great falling off in the consumptive demand for home trade. Fortunately, Europe was a continuous buyer, thereby preventing large accumulations of stock. Of late the demand for home trade has shown great improvement, and if this continues, as appears to be the case, it may be confidently hoped that prices will show a further improvement.

The enormous decline in the price of copper and the marked influence on the cost by reason of the difficulties with which the smelter had to contend, permitted the declaring of only two dividends, namely: One of three per cent. on September 30, 1907, and one of two per cent. on June 30, 1908.

ANNUAL MEETING OF THE CITY OF COBALT MINING COMPANY.

The annual shareholders' meeting of the City of Cobalt Mining Company was held on the evening of October 9th. Mr. E.

T. Shillington, M.L.A., was elected president, Mr. H. H. Long vice-president, and Mr. W. H. Powell second vice-president. Mr. B. W. Leyson, of the Townsite Mining Company, was appointed mining superintendent, and the position of manager was abolished. The following statement of liabilities and assets was accepted:—

Liabilities.

Capital stock of the company		$500,000 00
Outstanding accounts		7,924 19
Royalty due T. & N. O. Ry. Commission		40,000 00
Pay list, September, men	$6,603 92	
Pay list, September, office	425 00	
		7,038 92
To balance		1,162,818 38
		$1,717,781 49

Assets.

Office furniture, etc.		$600 00
Tool account		1,900 52
Buildings		6,772 03
Real estate		16,695 69
Plant account		14,272 04
Treasury stock not issued		48,783 00
Estimated value of mine as at present developed		1,500,000 00
Value of ore not shipped		13,000 00
Ore shipped to smelters and not yet accounted for, estimated		69,850 00
Cash on hand	$49 50	
Balance in bank	45,858 71	
		45,908 21
		$1,717,781 49
By balance		$1,162,818 38

STATISTICS AND RETURNS.

NOVA SCOTIA STEEL.

The coal shipments of the Nova Scotia Steel Company for the past nine months show an increase of 15,779 tons, as follows:—

Shipments September, 1908	56,367
Shipments September, 1907	60,355
Decrease September, 1908	3,988
Shipments 9 months, 1908	481,011
Shipments 9 months, 1907	465,232
Increase 9 months, 1908	15,779

Coal shipments from the collieries of the Cumberland Railway and Coal Company, Springfield, N.S., for September, amounted to 29,442 tons.

INTERCOLONIAL COAL CO.

Shipments, September, 1908	20,628
Shipments, September, 1907	21,003
Decrease, September, 1908	375
Shipments, nine months, 1908	191,992
Shipments, nine months, 1907	202,574
Decrease, nine months, 1908	10,582

INVERNESS RAILWAY & COAL CO.

Shipments, August, 1908	20,487
Shipments, August, 1907	22,422
Decrease, August, 1908	1,935
Shipments, nine months, 1908	192,730
Shipments, nine months, 1907	176,572
Increase, nine months, 1908	16,158

ACADIA COAL CO.

Shipments, September, 1908	25,133
Shipments, September, 1907	28,198
Decrease, September, 1908	3,065
Shipments, nine months, 1908	239,081
Shipments, nine months, 1907	230,243
Increase, nine months, 1908	8,838

CROW'S NEST PASS COAL CO.'S OUTPUT.

Coal production—First nine months, 1908	742,224 tons.
Coke production—First nine months, 1908	195,107 "
Coal production—First nine months, 1907	701,527 "
Coke production—First nine months, 1907	162,459 "
Output of coal, week ending October 16	19,202 "
Being a daily average of	3,200 "

Reports to the Provincial Bureau of Mines for the six months ending June 30 show that the metalliferous mines and works in the Province produced over eight million dollars worth of ore. The classification is as follows: Arsenic, 256 tons, value $1,573; cobalt, 365 tons, value $39,822; gold, 1,524 ounces, value $27,672; silver, 7,746,537 ounces, value $3,888,991; copper, 3,887 tons, value $547,417; nickel, 4,779 tons, value $932,828; iron ore, 84,440 tons, value $214,284; iron pyrites, 8,728 tons, value $27,968; pig iron, 148,365 tons, value $2,401,709. The total value is $8,083,264.

Following are the figures of German consumption of foreign copper for the months of January and August, 1908:

Imports of copper	107,387 tons.
Exports of copper	5,442 "
Consumption of copper	101,945 "

As compared with consumption during the same period in 1907 of 78,409 tons. Of this quantity 99,211 tons were imported from the United States. Reported by L. Voleglstein / Co., New York.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1st to date:

	Week end. Oct. 10. Ore in lbs.	Since Jan. 1. Ore in lbs.
*Cobalt Central	40,500	[illegible]
Kerr Lake	80,000	846,174
La Rose	120,000	6,490,640
Nipissing	260,200	[illegible]
O'Brien	191,260	5,463,647
Temiskaming	60,000	[illegible]
T. & H. B.	180,000	1,648,500

*Concentrates.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, B.C., Oct. 10.—The total shipments for the week were 34,332 tons, and for the year to date 1,359,186 tons. The

weekly shipments show a considerable falling off, as far as the totals are concerned. This is due to repair and extension work going on at the Granby Smelter, the output from those works being less than two-thirds of the capacity of the plant. On the other hand, the Trail Smelter, through the operation of its new furnace, handled more ore last week than at any time during its history, 9,220 tons. Several properties have recommenced shipping in each one of the principal divisions of the district.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January to date:

	Week end. Oct. 17. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	912,950
**Coniagas	.....	969,360
Cobalt Lake	.....	341,683
*Crown Reserve	.....	242,000
Cobalt Central	.....	443,475
Chambers-Ferland	.....	183,450
City of Cobalt	.....	1,197,220
Drummond	.....	1,065,620
Foster	.....	297,300
Kerr Lake	61,170	907,344
King Edward	.....	127,240
La Rose	120,000	6,610,640
McKinley-Daragh	178,000	2,517,770
Nipissing	185,200	2,564,970
Nova Scotia	.....	392,275
Little Nipissing	.....	40,110
Nancy Helen	.....	367,427
O'Brien	.....	5,463,647
Peterson Lake	.....	41,231
Right of Way	123,100	1,156,780
Provincial	.....	143,210
Silver Leaf	.....	258,030
Silver Cliff	.....	52 000
Silver Queen	.....	1,555,990
Townsite	.....	251,700
Temiskaming	.....	868,620
T. & H. B.	180,000	1,828,506
Trethewey	.....	1,910,476
Watts	.....	561,680

*Concentrates. **Concentrates and high-grade ore.

The total shipments for the week were 967,470 pounds, or 483 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, B.C., Oct. 17.—The shipments for the week ending October 17 show considerable activity in mining over all the districts, several new shippers being added to the list. The total for the week is above the average for the year, but not nearly as much as the capacity of the smelters warrant. The Trail smelter is treating more ore than at any time during its history, and its receipts for the week establish a new record for the consolidated company.

The following are the ore shipments for the past week and year to date:—

BOUNDARY SHIPMENTS.

	Week.	Year.
Granby	18,069	820,844
Mother Lode	8,772	189,736
Oro Denoro	900	51,006
Snowshoe	3,491	14,339
Phoenix Amalgamated	56	85
Other mines	.....	22,248
Total	31,288	1,098,262

ROSSLAND SHIPMENTS.

Centre Star	4,023	134,996
Le Roi	1,685	62,483
Le Roi No. 2	530	23,550
Other mines	.....	982
Total	6,238	222,011

SLOCAN-KOOTENAY SHIPMENTS.

St. Eugene	726	19,643
Whitewater	45	1,471
Whitewater, milled	280	12,620
Poorman, milled	250	8,800
Queen, milled	400	7,790
North Star	69	3,364
Richmond	69	1,870
Arlington, Erie	24	1,870
Standard	42	1,102
Rambler-Cariboo	38	968
Silver Cup	51	742
Idaho	98	634
Ruth	21	618
Slocan Star	31	315
Hewitt	33	314
Maestro	89	89
Canadian Group	17	39
Rio	15	15
Black Diamond	6	6
Other mines	.....	17,019
Total	2,208	78,611

The total shipments for the week were 39,734 tons, and for the year to date 1,398,884 tons.

MARKET REPORTS.

Oct. 23.—Connellsville coke, f.o.b., ovens:—
Furnace coke, prompt, $1.40 to $1.50.
Foundry coke, prompt, $2.00.

Metals.

Oct. 23.—Tin, Straits, 29.45 cents.
Copper, prime Lake, 13.70 to 14.75 cents.
Lake arsenical brands, 13.60 to 13.70 cents.
Electrolytic copper, 13.50 to 13.60 cents.
Copper wire, 14.75 cents.
Lead, 4.25 cents.
Spelter, 4.825 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 7.125 cents.
Aluminium, 25 cents.
Nickel, 40 to 47 cents.
Platinum, $21 to $23.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $46 per 75-lb. flask.

Silver Prices.

	New York. cents.	London. pence.
October 10	51 5-8	23 13 16
" 12	51 5-8	23 13 16
" 13	51 5-8	23 13 16
" 14	51 5-8	23 13 16
" 15	51 3-8	23 11-16
" 16	51 1-2	23 3-4
" 17	51 3-4	23 7 8
" 19	52	24
" 20	51 1-2	23 3-4
" 21	51 3-8	23 11 16
" 22	51 1-2	23 3-4
" 23	51 3-8	23 11 16

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When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the Government

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has produced to the end of 1906, $68,721,103 of Placer Gold; $41,015,697 of Lode Gold, $25,586,008 of Silver; $17,625,739 of Lead; $35,546,578 of Copper; $79,334,798 of Coal and Coke; and $5,813,799 of Other Minerals; or a total of **$273,643,722.** The Mineral Production of the Province for 1906 was

$24,980,546

The Tonnage of Ore mined in 1906 was 1,963,872 tons. The Gold Production in 1906 was $5,579,039 the Lead Output 52, 408,217 lb., and the Copper 42,990,488 lb.

Lode Mining has only been in progress for about 14 years, and not 20 per cent. of the mineral land has been even prospected; 300,000 square miles of unexplored mineral-bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than any other Province in the Dominion, or than any Colony of the British Empire.

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Synopsis of Canadian North-West Mining Regulations

COAL—Coal mining rights may be leased for a period of 21 years at an annual rental of $1 per acre. Not more than 2,560 acres shall be leased to one individual or company. A royalty at the rate of five cents per ton shall be collected on the merchantable coal mined.

QUARTZ—A person 18 years of age, or over, having discovered mineral in place, may locate a claim 1,500 x 1,500 feet.

The fee for recording a claim is $5.

At least $100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1 per acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly.

An applicant may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental $10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds $10,000.

W. W. CORY,

Deputy of the Minister of the Interior

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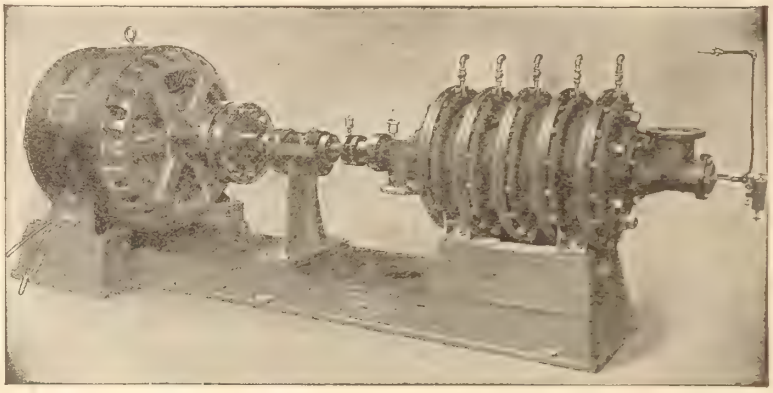
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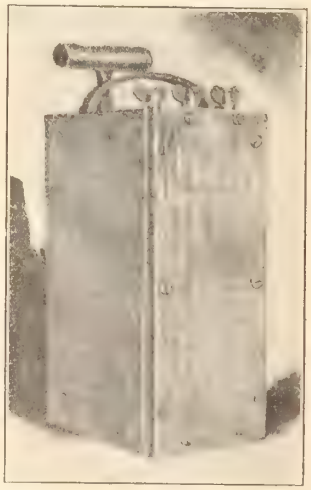
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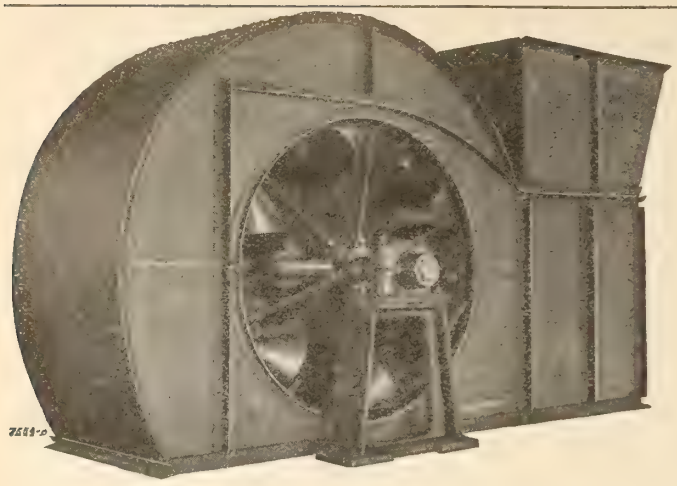
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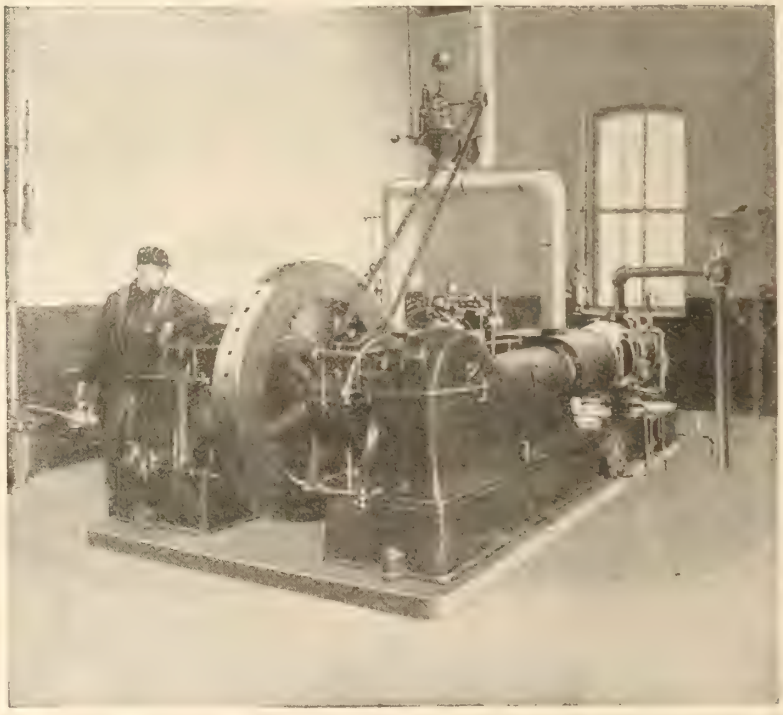
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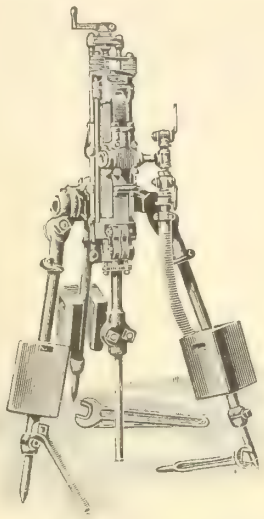
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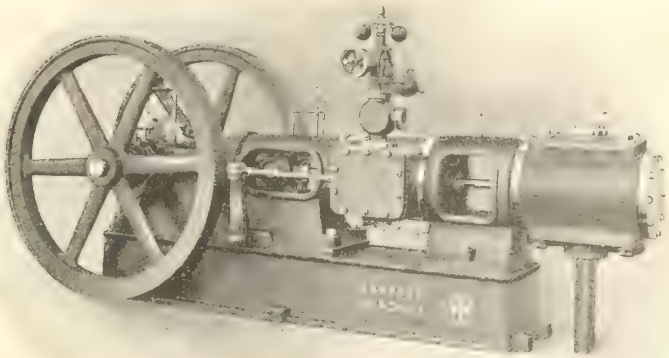
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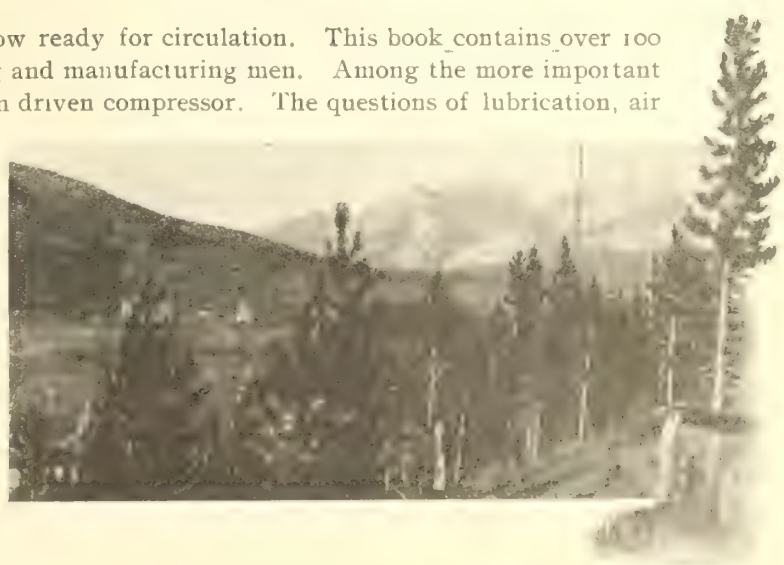
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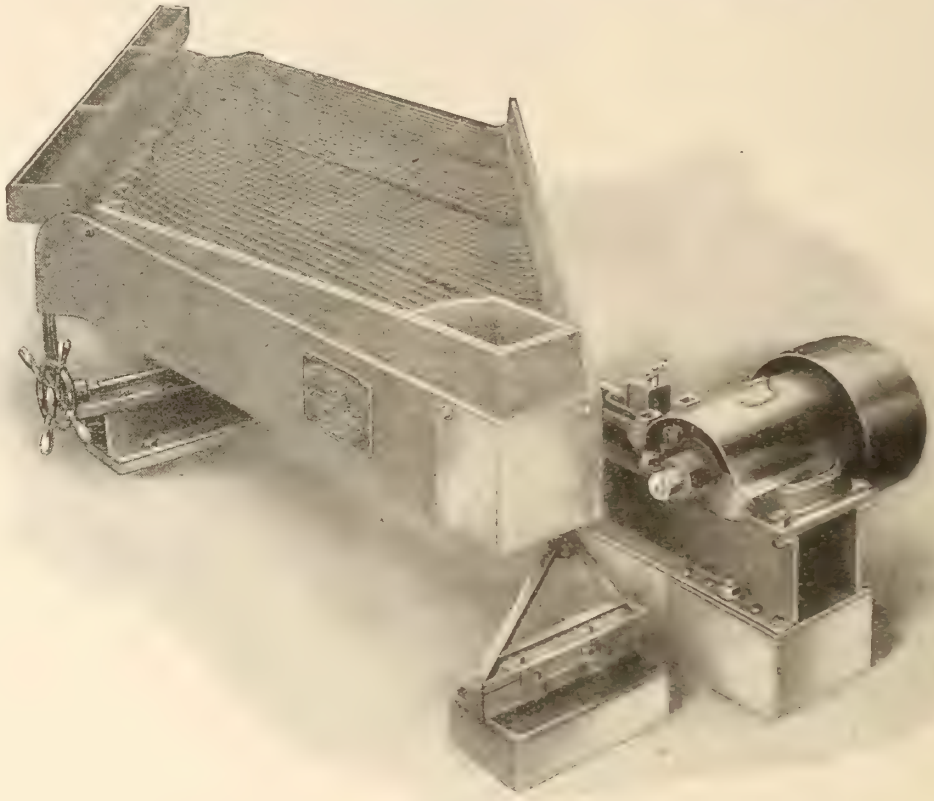
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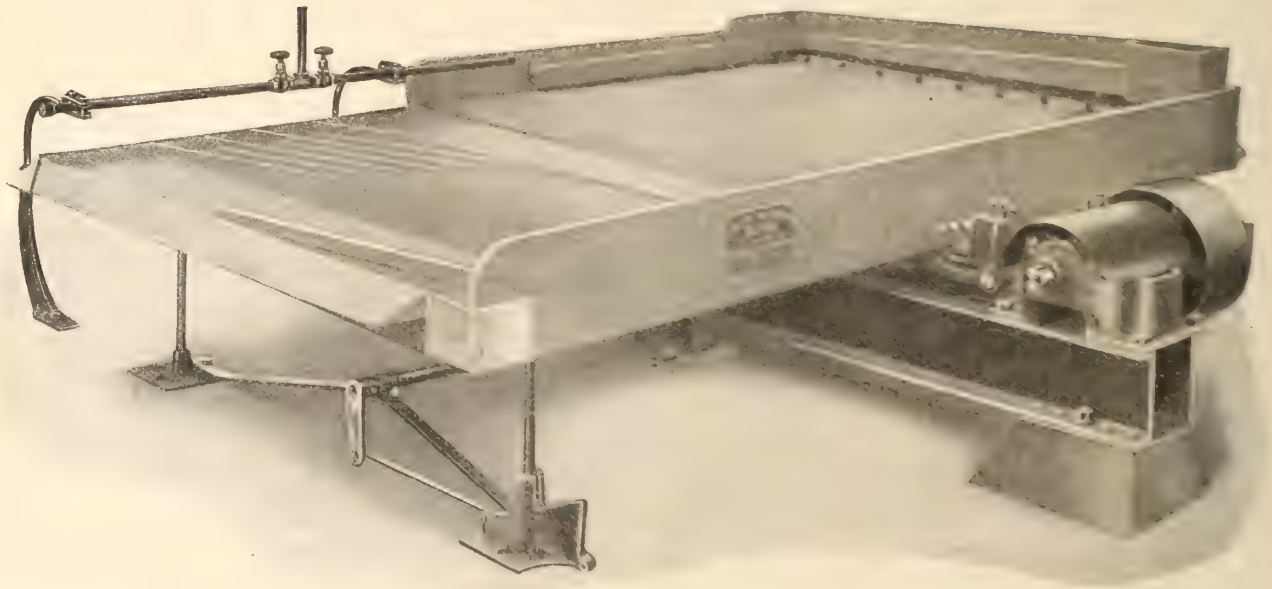
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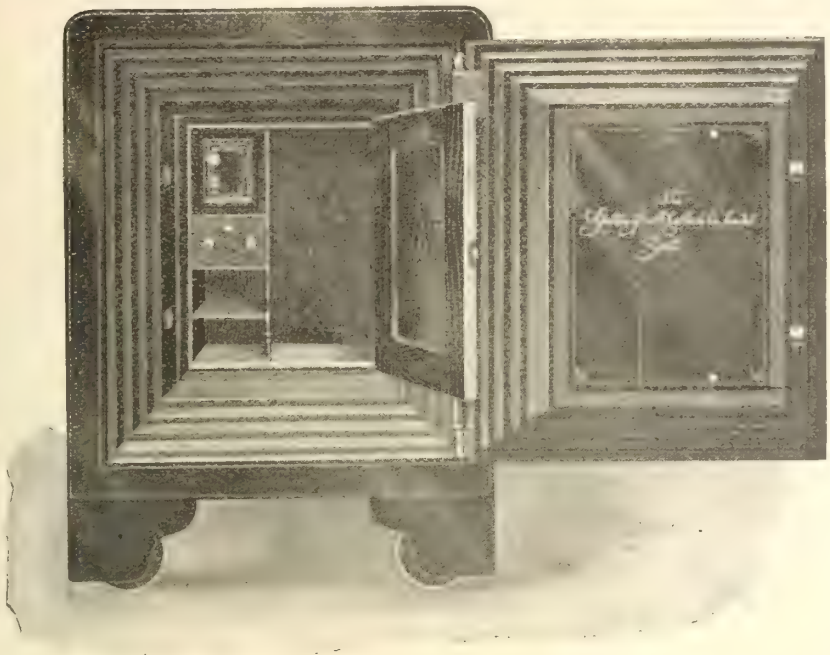


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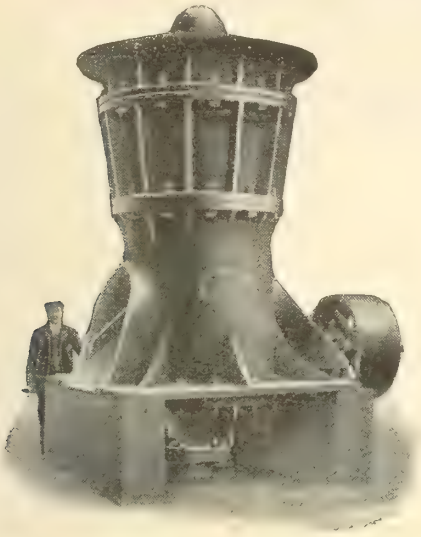
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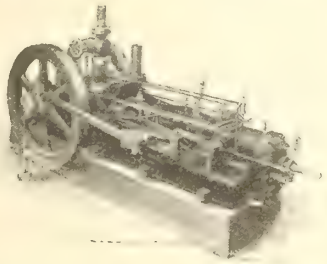
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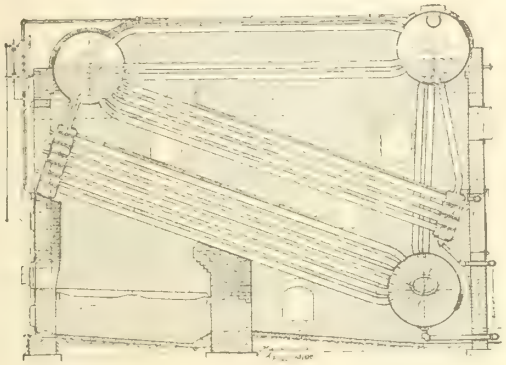
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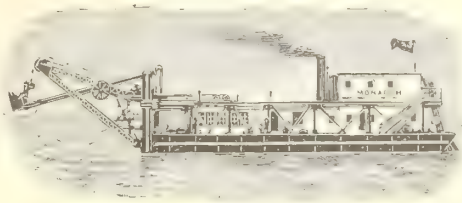
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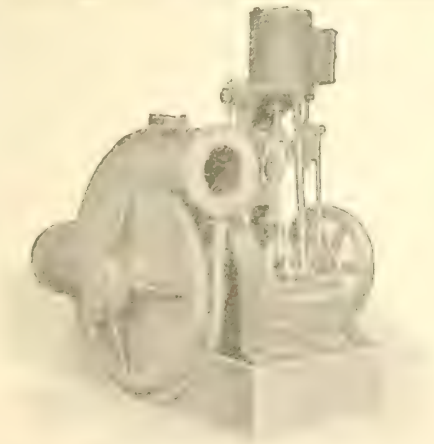
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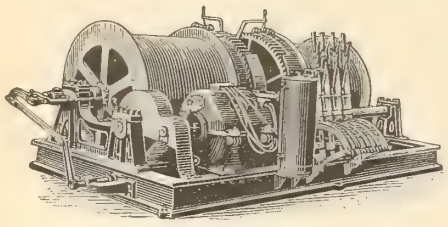
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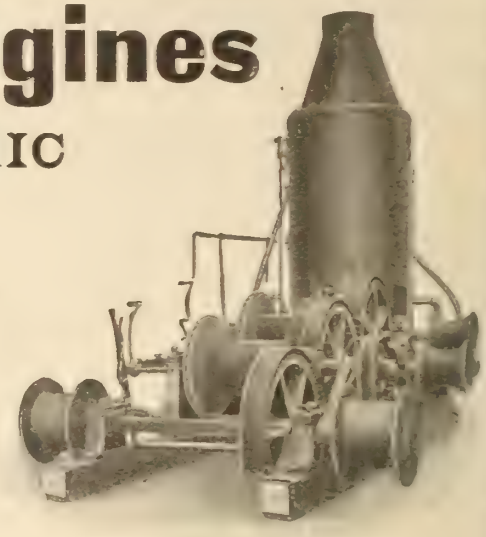
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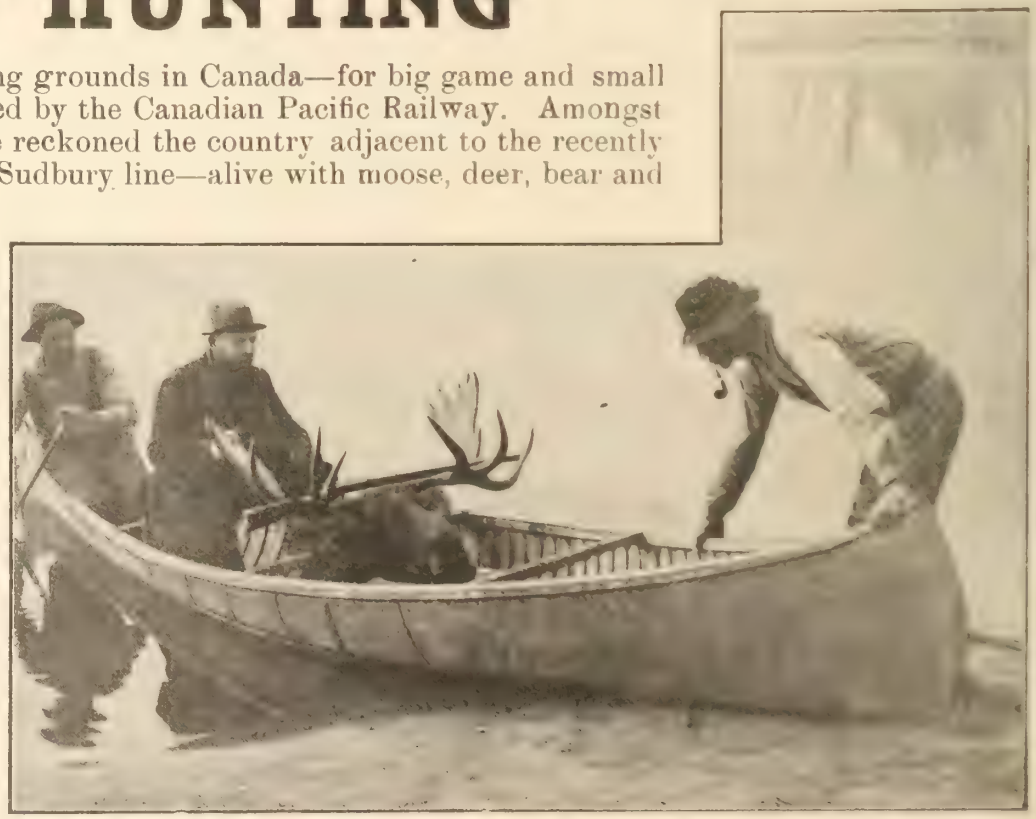
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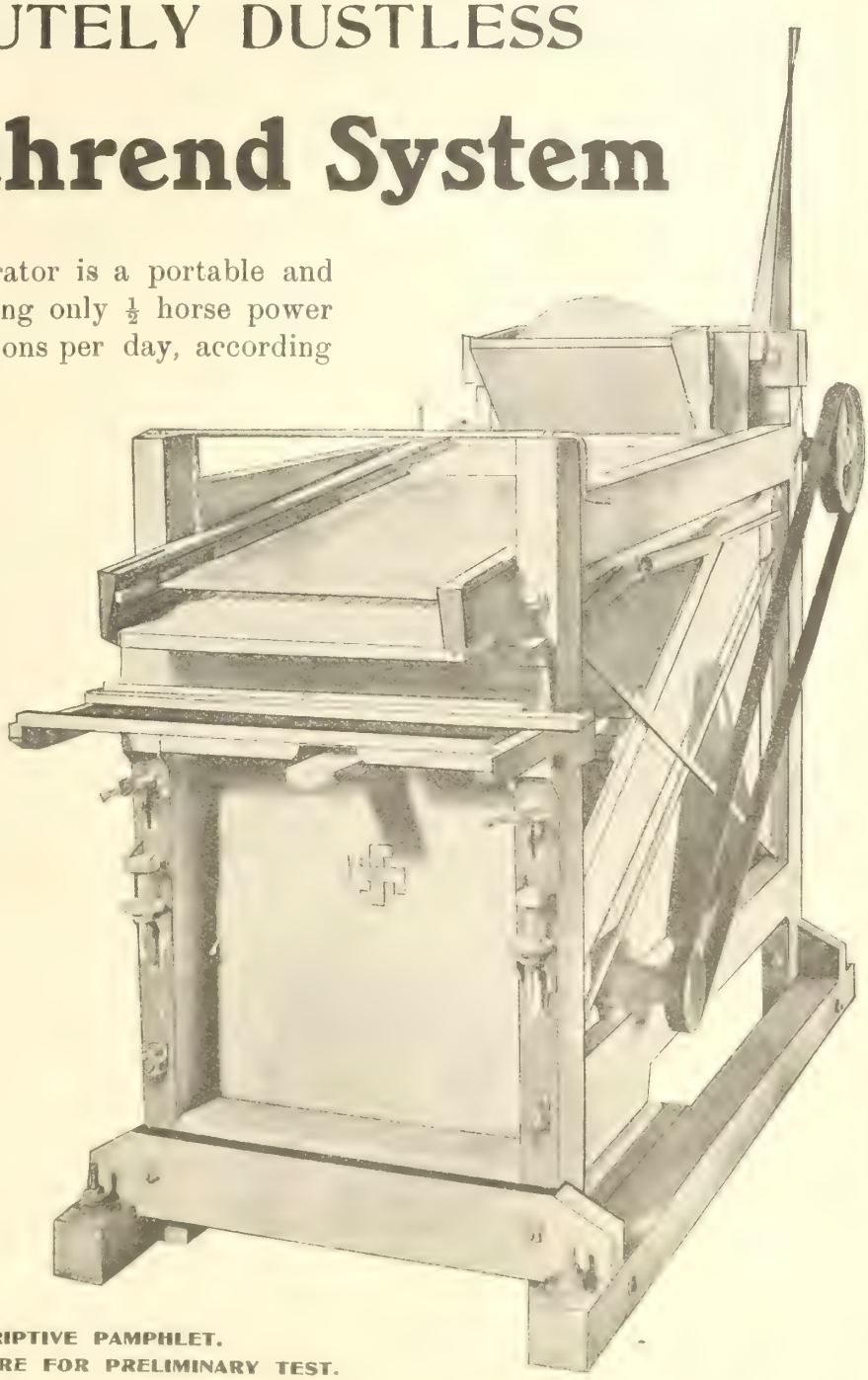
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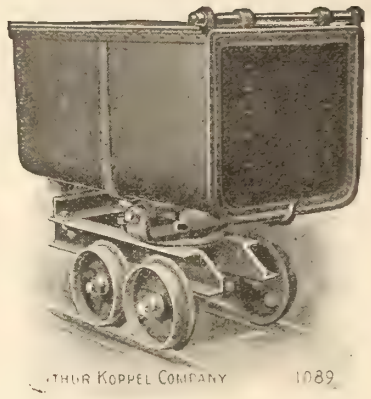
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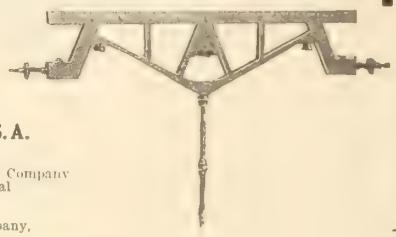
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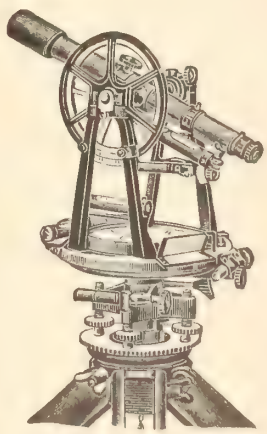
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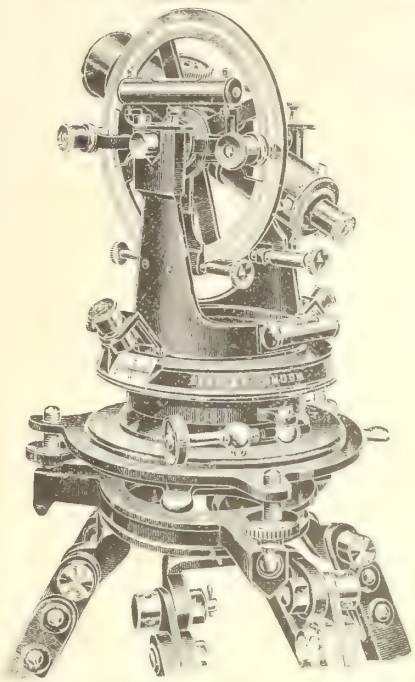
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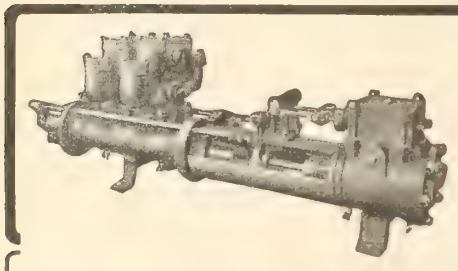
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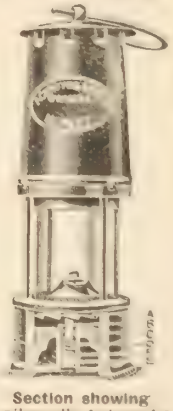
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VOL. XXIX. TORONTO, November 15, 1908 No. 22

The Canadian Mining Journal

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With this engine soundly installed, we shall hope for great things for our iron industry.

THE PREVENTION OF MINE EXPLOSIONS.

We reprint in this number of the Canadian Mining Journal the "Report and Recommendations" of the three foreign experts engaged by the United States Department of the Interior to investigate coal mine explosions.

The three men selected to undertake this task are authorities of the highest standing. They fill respectively the offices of Inspector-General of Mines, Belgium; Councillor of Mines, Germany; and H. M. Inspector of Explosives, England.

The report marks a turning point in the history of coal mining in the United States. Heretofore the most frightful accidents have created but a temporary stir. The authorities at Washington have been apathetic, and their apathy has cost the nation thousands of useful lives. Now that the awakening has come, there is little doubt that complete measures will be adopted for the prevention of coal mine accidents.

The first step to be taken is the close inspection of explosives. Without this preliminary, all precautions are meaningless. Not only should permitted explosives be limited to those that pass satisfactory tests as to safety, but the maximum charge should be fixed by law, and uniform regulations as to handling, loading, and firing of explosives should be enforced at every colliery.

The second important measure is the universal introduction of safety lamps. There is little doubt that this will meet with opposition, especially from the workmen whose safety is being considered. There is no doubt that safety lamps are essential to the prevention of explosions.

Thirdly, it is of the most urgent importance that rescue apparatus be installed at all coal mining centres. We need not reiterate the arguments that justify this recommendation. The history of the great coal mining disasters of the past few years is conclusive proof of the justice of this statement.

Fourthly, there is much misapprehension as to the applicability and efficacy of mine-watering as a preventive of coal-dust explosions. We have referred more than once to the strong position taken by Mr. James Ashworth, who has condemned the belief that watering is a universal remedy. The question is one that requires full and searching inquiry.

Lastly, the prevention of mine explosions is a subject of international importance. Difficulties will not be solved, dangers will not be removed unless there is earnest co-operation between governments, operators, and employees.

The recommendations of Messrs. Desborough, Meissner, and Watteyne are timely. They will serve as a nucleus for further work. But we are disappointed at their lack of completeness. The omission of all mention of rescue apparatus is a serious oversight.

Before leaving this subject we desire to impress upon Canadian coal mine operators the need of keeping pace with this praiseworthy movement. And it is to be hoped that our Federal Department of Mines will give the matter attention at the earliest possible opportunity. Canada must not be last in adopting measures for the preservation of life.

THE COBALT BOOM.

An apparently well-grounded hope was entertained by sane mining men that this autumn's boom in Cobalt stocks would not exceed the bounds of reason and propriety. It was foreseen at least ten months ago that a boom was inevitable. But there seemed to be scant room for a recurrence of the crude robberies and "raw deals" that characterized the first boom.

The boom, however, has attained dimensions that are distinctly dangerous. The lessons of the last two years have been ignored or forgotten, and Cobalt stocks are playing over the financial sky like mad northern lights.

One effect of the boom of 1907 was that the legitimate exploitation of the undeveloped portions of Cobalt and of the Montreal River districts was retarded. For a time Cobalt became an object of contumely. Then, gradually, the clean work of clean men brought results, and an output of six million dollars' worth of silver was an argument not to be ignored.

Of the several hundred mining companies incorporated up to and during the year 1907 only about thirty now survive on a working basis. Not more than twenty of these have paid dividends. Several of the companies that have paid dividends were totally unprepared to maintain payments. Every one of the hundreds of flotations appealed to the public with rosy promises and hectic adjectives. A large number of the worst of these received the support of the Toronto World.

Glancing through the advertising columns of the Toronto World, which has constituted itself the chief tout for all classes of Cobalt and Montreal River wildcats, we notice that several new flotations, especially those that occupy advertising space, are given warm commendation in the special mining columns of this obviously purchasable sheet. It strikes one as being lamentably significant of journalistic turpitude that a paper of the World's standing uses its reading columns to misdirect and delude those whom it is supposed to protect. The readiness with which the World declares that a youthful promoter is an "acknowledged expert," or that a case-hardened faker is a "mining engineer of continental reputation," is pre-eminently painful.

The most enthusiastic friends of Cobalt and Montreal River will acknowledge that there are, especially in boom times, many crooked flotations foisted upon the public. Does the World ever damn any of these? Does it do anything but play into the hands of men whose dice are loaded and whose cards are marked?

This is a time when mining men and others are in duty bound to exercise discretion. There is nothing reprehensible in lending one's name to a mining project. But it is at least incumbent upon responsible citizens to make sure that there is no room for doubt as to the soundness of the concerns with which their

names are associated. Our attention has been drawn to the fact that Mr. James L. Hughes, Chief Inspector of Schools for Toronto, and Mr. J. Houston, superintendent of the Right of Way mine, have permitted their names to be used in connection with two recent flotations, one of which is considerably worse than the other. In all such instances as these the names of prominent men are of use to promoters merely as bait. And it is notorious that bait of this kind is most effective among doctors, school teachers, farmers, and laborers. Therefore a very grave responsibility devolves upon the shoulders of Mr. Hughes, who is an outstanding figure in educational circles, and upon Mr. Houston, who carries with him the prestige of a successful mine. In dealing with both of these gentlemen we wish to be frank. Of Mr. Hughes we say this: he is guilty of a major indiscretion when, as Chief Inspector of Schools, he uses his official standing to aid a precarious mining scheme. Mr. Houston's action we must deplore even more deeply.

In conclusion, it is obvious that the Ontario Companies Act is a dead letter. Not one of the mining advertisements published in Ontario papers conforms with the requirements of the Act. Not a few of the advertisements are direct breaches of the Act. Unless the Provincial authorities and decent mining men rise to the occasion at once, we shall have a recrudescence of such highway robberies as were perpetrated not long ago by Law and Russell.

RUSSIAN ASBESTOS.

It will be of interest to Canadian asbestos producers to learn that the principal asbestos deposits in the Urals have been sold to a German syndicate. The Korieff mine, the Pokleffsk mines, and the mines of Baron de Sukanton have passed into German hands. The Pokleffsk property includes the only mill operated in the whole region. The total annual output of the properties mentioned amounts to about 470,000 poods, or 8,460 short tons, which is more than eighty per cent. of Russia's whole yearly production.

This announcement gains an especial significance from the fact that Germany is the chief European consumer of Canadian asbestos.

A JAPANESE ENTERPRISE.

On Moresby Island, one of the Queen Charlotte group, lying off the shores of British Columbia, there is a promising copper mine. The ore deposit was discovered in May, 1906, by Mr. A. Ikeda, a Japanese merchant, who was at that time interested in the abalones fisheries. The history of the mine from that time to this is outlined by Mr. Ikeda on another page of this issue.

There are many unique features about the Ikeda mine. All of the employees, with the exception of five white men, are Japanese. The company was floated in Kobe and Osaka, Japan. One of its principal officers is Mr. Owaya, who is a member of the Japanese Diet. The company name is "Awaya-Ikeda."

Several residences and other buildings have been erected on the Awaya-Ikeda property. The Japanese miners, however, live in the old abandoned stern-wheeler "Dawson," built by the C. P. R. for service on the Stikine River. The manager, Mr. Ikeda, occupies the charthouse.

The Ikeda mine began shipping ore early. It is now producing at the rate of fifty tons per day. Its owners expect great things, and, apparently, they have made a healthy start.

NEOTERIC NICKEL.

Here is something new under the sun. A valued correspondent, whose letter is not printable, beseeches us to smite error in high places. He encloses, for our delectation, a clipping from our venerable London contemporary. The clipping is a paragraph on the metal nickel, and the paragraph is part and parcel of an article of a series entitled "The Recognition of Minerals."

Mr. C. G. Moor, M.A., F.I.C., the author of the article, disarms criticism by asking for correction and suggestions as to "a better way of dealing with the subjects touched upon." By way of proving that this request is not a superfluity, he writes thus of nickel:

> "One of the most important modern uses of nickel is to form the outer skin of rifle bullets. With modern rifles the rapidity of the bullet through the barrel is so great that a soft (lead) bullet would tend to strip and foul the rifling, and hence modern rifle bullets consist of a coating of nickel filled with lead.
>
> The principal ore of nickel mined at the present time is garnierite (also called noumeite).
>
> Garnierite (which has already been described under "Green Minerals") may also be greyish or nearly white, and sometimes a brown; to this variety the name "chocolite" has been given.
>
> Garnierite is mined in New Caledonia and at the Sudbury Mines, in Canada. Noumeite is essentially a silicate of nickel with magnesium silicate.
>
> The ore from Sudbury is silicate of nickel with some copper silicate. These are the two most important commercial ores."

One of the most important modern uses of education is to enable authors to ascertain a few facts about their chosen topics. Poets, lawyers, ladies, and promoters are privileged classes. But the man of science deals with ascertained facts. Ascertained facts concerning the occurrence of the nickel ores of Sudbury and New Caledonia are easily available.

Stern logic drives us to the conclusion that, since Mr. Moore is presumably neither a lawyer nor a pro-

moter, he must be either a poet or a lady. If the last alternative prove true, we forgive her. If the author be a poet, we demand hexameters in future.

"ROARING" STAMPS.

A writer in the Toronto Globe's special Cobalt supplement deals thus with the stamp-mill of the Muggley concentrator:—

"Every hour the 20 roaring stamps pounding down on the rock reduce 85 tons to pulp."

"Roaring" is good; "85 tons" per hour for 20 "roaring" stamps is better. Heretofore a duty of three to six tons per stamp in 24 hours has been accepted as a fair standard. But if the Globe's announcement be true, then are all other stamp-mills fit only for the scrap-heap. When each stamp has a crushing capacity of about 100 tons in 24 hours it is high time that laggards (who get only this duty out of twenty times one) and find out what's dong. Strange to relate, we believe that the Globe's announcement will be news to the proprietors of the Muggley mill.

After careful thought, we can attribute the remarkable capacity of the Muggley stamps (as announced by the Globe) to nothing but the "roaring" qualities of the stamps.

Thus science marches. In future all purchasers of stamp-mills will include in their specifications a carefully designed roar.

CANADIAN BANKING.

Collier's Weekly, American edition, for October 17, publishes this remarkable statement: "Canada guarantees bank-notes, but has not thought of guaranteeing deposits." Collier's is laboring under complete misapprehension. Canada does not guarantee bank-notes. Except in the case of the one dollar and two dollar notes (which are not bank-notes) issued by the Government, there is not one cent of gold behind our bank-notes. Depositors in the Postoffice saving bank are guaranteed. Depositors in chartered Canadian banks are not guaranteed.

IKEDA BAY MINE.

Written for The Canadian Mining Journal by A. Ikeda.



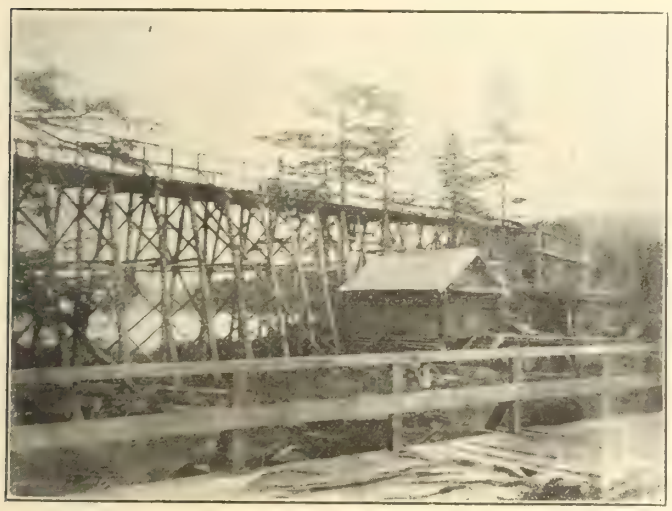
LILY MINE—FRONT VIEW OF No. 3 TUNNEL.

This property is situate on the southern end of Moresby Island in Ikeda Bay, one of the Queen Charlotte group, British Columbia. It is reached by C.P.R. steamer four times per month and is distant from Vancouver about 450 miles. It is distant from Jedway about three miles in the next bay north, which is now the seat of the Government Recorder and where all the claims on Queen Charlotte Islands are recorded. The town of Jedway has telephone connection with Ikeda Bay and is connected by good government trails. It also has a good sawmill, hotel, store, etc., all of which have been built within the last year or so. The Copper Queen, a very promising property, which is owned by Seattle people and where extensive drilling with dia-

mond drill is going on, also the Eagle Tree group of mines all are around Jedway, the latter property being under bond to the Tyee Copper Co., a wealthy English company. At Collison Bay, the next bay south of Ikeda Bay, there are some promising properties, notably the Meal Ticket, Thunder, and Maple Leaf groups, the latter, where development work is going on, being now under bond to some Bellingham Bay people.

Further north from Jedway, about 50 miles, is the "Swede" group, which is bonded for a large sum of money. This is a large low grade property having a very large vein of self fluxing ore and by some it is believed to be a larger property than even the Granby mines. Of course it will take development to prove this, but according to present indications it looks very favorable for it being another Granby. All the mines on the islands are blessed with easy transportation facilities, as the mountains come down fairly straight to the water where large steamers can load right from the bunkers. This fact alone makes these islands very enticing to mining people.

The climate on these islands is very mild, no snow or winter at all, although there is quite a bit of rain with high winds.



TRESTLE AND NO. 4 ORE BIN.

Geology.—Around Ikeda Bay and the south shore of Skincuttle Inlet are limestone and slate. The entire country surrounding Ikeda Bay is cut by dykes of greenstone and other igneous rocks, such as diorite. It has been subject to movements resulting in well defined fissures and also in slips or fissures at right angles to and between the main fissures. The main fissures are vertical, the others approximately horizontal. The horizontal fissures or slips are of great number and reach from one main fissure to another, following their plane along the main fissure. It is along the horizontal fissures that the largest ore bodies have been made.

The formation around Ikeda Bay is diorite and limestone.

Vein.—The vein is what is called a contact vein, having good and well-defined walls, carrying an average width of 5 feet and as wide as 30 feet in some places. The vein dips to the east at an angle of about 45 degrees.

Development.—The property is developed with four tunnels. The depth from the face of the lowest level to the outcrop is 300 feet. These levels are all connected with raises, etc. Greater depth than ever will now be attained on account of the elevation of the mountain. The faces of all tunnels will from now on make foot for foot in depth.

Area.—The entire number of mineral claims which this company own is 47, but the work is being almost entirely devoted to what is known as the Lilly group.



ORE BOAT LOADED WITH 1,000 TONS ORE.

All these claims are situate around Ikeda Bay and take up the whole water front.

Shipments.—From November 1906 to the 1st of September 1908, 5,608 tons of ore have been shipped from the mine. Twenty-one hundred tons of this ore was first-class and averaged 12 per cent. in copper, $6 in gold and $4 in silver. The remaining 3,568 tons was second-class ore and averaged 6 per cent. in copper, $3 in gold and $2 in silver. This is taken from smelter returns. All this ore was shipped to the Tyee Copper Company's smelter at Ladysmith.

Equipment.—The mine is distant from tide-water 6,100 feet and is connected with a surface tramway of the same length. The cars run down by gravity to the ore bunkers at the water but have to be hauled back by horses as the elevation from the water to the lowest level is only about 200 feet. Later on I expect to equip this tramway with an electric motor.

Equipment.—There is a new Ingersoll air drill with large new boiler capable of running three drills.



Used by the Japanese miners as a bunk-house.

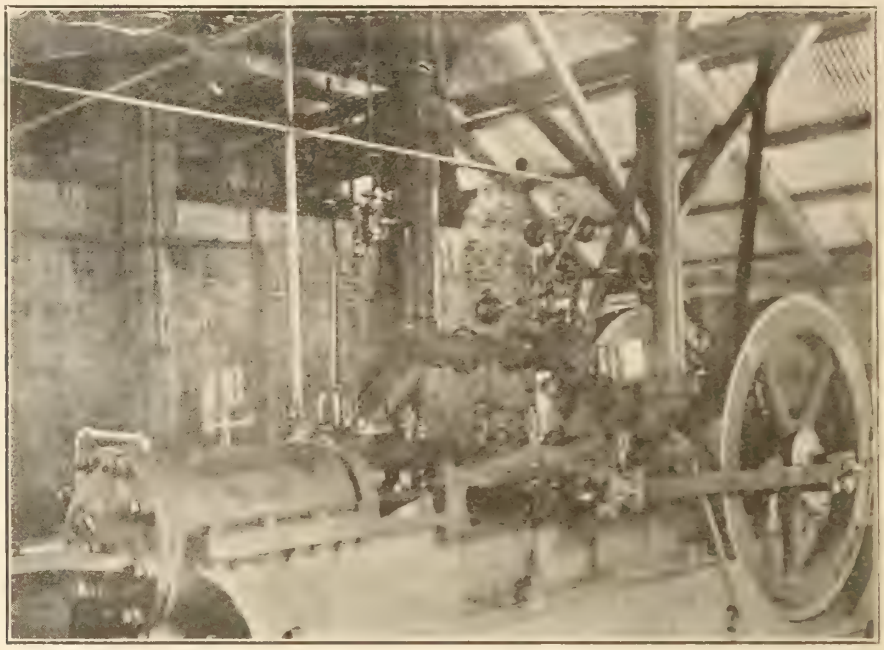
There is a large ore bunker at tide-water which has just been completed, capable of holding 1,000 tons of ore and the ore from this is loaded into the steamers almost automatically.

There are also two smaller ore bunkers at the mine, one of a capacity of 400 tons and the other of 100 tons.

The mine is well equiped with buildings, having a large bunk house and boarding house for the miners, engineer's house, superintendent's house, store house, assay office, stables, blacksmith shop, etc.

There are about 80 Japanese employed and 5 white men, the foreman and engineer, etc., being white men.

History.—This property was first discovered in May 1906 by the writer while he was engaged in the business of fishing for abelones. It is now a little over two years since the first pick was put in the ground and, considering the distance from supplies and the lack of facilities for getting things into the island, the advancement has been marvelous. The property has been shipping from nearly its infancy.



IKEDA MINE—ENGINE HOUSE

REINFORCED CONCRETE FOUNDATIONS FOR STAMP BATTERIES.

Paper read before the Institution of Mining and Metallurgy, by S. J. Truscott, Member, and John P. Fuller, Associate.

The wooden mortar blocks for the stamp batteries at Redjang, Lebong, Sumatra, which dated from the year 1898, having become rotten around the bolt holes and above ground generally, it became necessary to replace them. Being imbedded in much concrete, it would have been difficult to have drawn them, nor was this course necessary, because they were found to be in good condition below, and would not interfere with the stability of the concrete blocks it had been decided to raise over them. They were accordingly cut down sufficiently to allow a base blocks of concrete 850 mm. (2 ft. 9½ in.) in depth to be rested upon them, with its upper surface level with the ground. The block was built to accommodate ten stamps, and was 4700 mm. (15 ft. 5⅛ in.) long by 2600 mm. (8 ft. 6⅜ in.) wide, and, outside the limits of the wooden blocks, it rested upon a levelled surface of crushed stone beaten down upon the boulder clay which constituted the country rock; there was no question of putting the battery upon a more solid bedding.

At the back and on the same level the foundations for the central and two outside sills were hung out for a total length of 1830 mm. (6 ft.), each having at its end an expanded base, in which rails were embedded to distribute longitudinally the weight brought down by the ore-bin posts.

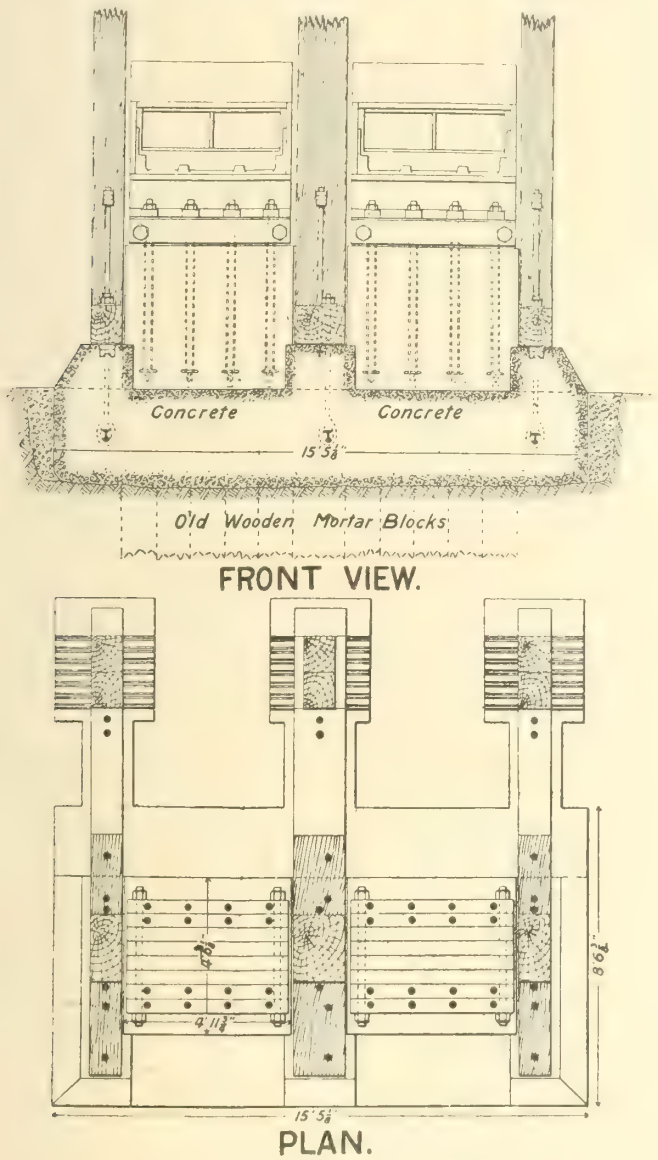
Into the main base block twelve 38 mm. (1½ in.) bolts, four under each king-post, were anchored on rails, to hold down the sills of those posts; and three other bolts of the same size were put down in the back foundations to secure the sills of the ore-bin posts.

It is pertinent here to give some description of the stamp and mortar box. The total weight of the falling stamp was 522 kg. (1150 lb.) and the number of drops was 96 per minute through 195 mm. (7¾ in.). The mortar box had, by reason of the difficulties of transport, to be sectionalised, the bottom being made up of seven cast iron cross sections having planed faces, drawn together by four longitudinal bolts of 45 mm. (1¾ in.) diam., with nuts recessed in the end sections. The upper parts of these boxes were of 13 mm. (½ in.) steel plate riveted together and to the bottom sections.

In order to relieve these longitudinal bolts of any undue strain which might come upon them by reason of irregularities of seating, each box was placed on an anvil block made up of longitudinal sections brought together by two transverse bolts of 57 mm. (2¼ in.) diam., the joints being planed and grooved, the bol-

tom of the box and the upper and lower surfaces of the anvil block were also planed.

The box had a width at its flanged base of 750 mm. (2 ft. 5½ in.), and, when using original wood blocks, six anvil sections were bolted together, making a total width of 760 mm. (2 ft. 5⅞ in.), the same as that of the blocks; one set of eight holding-down bolts then secured both the box and the anvil block. For the concrete it was decided to include eight sections in the anvil block to make a total width of 1015 mm. (3 ft. 4 in.), which would allow two sets of bolts, one of short bolts to hold the box on to the anvil block, and the other of long bolts to hold down the anvil block upon the con-



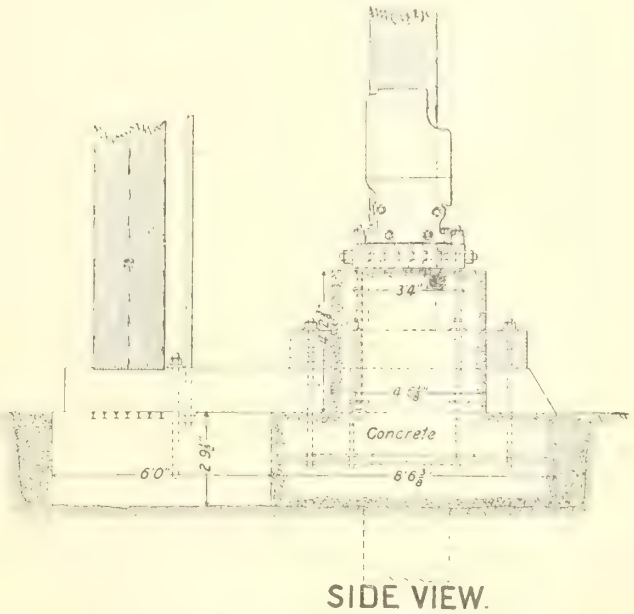
crete, which would then be given a width of 1375 mm. (4 ft. 6⅛ in.). The short bolts had countersunk heads which were winged to prevent rotation, but had there been convenience here they would have been so made that in case of breakage they could be withdrawn without the necessity of dismantling the box, which now exists, though the chance of breakage appears to be inconsiderable, special care having been taken to give them a true seating.

The usual design of concrete block has in transverse section a gradually increasing thickness towards the base, which design permits the holding-down bolts to be inclined, with their pocket holes removed from a position directly beneath the box, thus allowing the concrete there to be solid; another point of the usual design is that the bolts are laid in recesses from which they can be readily withdrawn in case of breakage.

In the case of the battery under description, such an increase of dimension towards the base would have encroached upon the freedom of the line shafting behind and have also thrust the pulp launder out of position in front, because there were no copper plates to carry the pulp well forward. The pulp dropped immediately into a launder set at a suitable inclination from both ends to the centre; the copper plates were kept in a separate house.

Further, the amount of metal in the flange at the base of the box and the shape of the anvil block did not allow of any departure from the vertical position for the bolts. With the material available, therefore, a straight up-and-down concrete block was determined upon.

Seeing that between the bottom of the box and the bolts in the concrete there were three intermediate bolts



to take up the jar of the blow, it was considered that those bolts were beyond reasonable chance of breakage. Their lower ends were therefore imbedded fast in the concrete, but in case a bolt should break it can still be withdrawn through the pipe casing in which it runs by first chipping away the concrete to free the cotter, when the vertical position of the bolt will allow it to be drawn up free of the box, whether front or back.

These bolts were 38 mm. (1½ in.) diam., but at the ends they were expanded to 42 mm. (1⅝ in.), to make good the loss of strength caused by the cotter hole or screw thread; they were also made long enough to allow the insertion of a deep cast-iron washer under the nut at the top, so that should a bolt break at the thread, or the thread become stripped, there would, upon removal of this washer, be space enough to cut another thread.

Such a mortar block for five stamps was 1520 mm. (4 ft. 11¾ in.) long, 1375 mm. (4 ft. 6⅛ in.) wide and 1280 mm. (4 ft. 2⅜ in.) deep; it rested upon the base block beneath to form with it one construction, of which the weakest plane was that where these two masses

met, across which plane a reinforcement was desirable, and was made by standing 25 iron rails so that one-third of their strength was in the base block below and two-thirds in the mortar block above, the average rail length being about 1500 mm. (4 ft. 11 in.). These rails were placed in five rows of five, and they were bound around and across with about 30 k. of twisted band-iron and 75 m. of barbed wire, the reinforcement being arranged in a manner prescribed for making concrete piles for general foundation work.

The crushed stone used in making the concrete was a hard andesite passed through a crusher set to a 38 mm. (1½ in.) ring. This material when screened over a bar screen set to 13 mm. (½ in.) spaces gave 43 per cent. coarse and 57 per cent. fine, the former containing 1 per cent. moisture and the latter 4 per cent. As this showed a good proportion of fines no such separation was made and the material was entered into the aggregate just as it was crushed.

The sand available was the well-washed residue from the cyanide works; this showed only about 10 per cent. remaining on a 40 mesh, so that in itself was not a good sand, being too fine and too regular in size, but taken together with the high proportion of fine material in the crushed stone it was suitable.

The cement used had the following grading, showing it to be rather coarse:—

			Remaining on	90	mesh	12.1 per cent.
Passing	90	mesh	"	150	"	3.3 "
"	150	"	"	200	"	17.2 "
"	200	"	"		"	67.4 "

It also showed alkalinity to the extent of 3.74 per cent., reckoned in terms of $Ca(HO)_2$, this presence of free lime being further indicated by a marked rise of temperature upon setting. But in spite of these departures from good character the tests to which it was submitted for soundness showed no signs of twisting, cracking, or distortion. In the actual process of working it took its initial set within half an hour and its hard set within three hours, thereby showing itself a convenient cement.

In order to arrive at the proper proportions of material to be used, determinations for voids were made with the crushed stone and the sand by loosely filling a measure having a capacity of ⅛ of a cub. m. without subsequent shaking, these being the conditions which would prevail at the actual mixing. The results showed the crushed stone to have 40 per cent. voids and the sand 47 per cent., these figures being higher than those generally recorded for such materials, which allow the measure to besettled by shaking, to reproduce the settlement caused during the transport of the measured material to the place of mixing. Allowing that the sand should fill the voids of the stone and the cement those of the sand, the proportions to make a good balance were determined as follows:—

Crushed stone	1000 parts.
Sand 40/100×1000	400 parts.
Cement 47/100×400=188, or say	200 parts.

or Cement 1. Sand 2. Crushed stone 5.

The actual amounts and proportions used for 10 stamps were as follows:

	Cement.	Sand.	Crushed Stone.	Proportion
	Cub. m.	Cub. m.	Cub. m.	
Back sill foundations	0·312	1·707	3·414	1 : 5 : 10
Bottom base block	0·500	1·500	4·000	1 : 3 : 8
Middle " "	0·625	1·250	3·125	1 : 2 : 5
Top " "	0·750	1·500	3·750	1 : 2 : 5
Bottom mortar block	0·500	1·000	2·000	1 : 2 : 4
Top " "	0·687	0·687	2·061	1 : 1 : 3
Shoulders for sills of king-posts.....	0·375	0·375	1·125	1 : 1 : 3
	3·749	8·019	19·475	1 : 2·1 : 5·2

The total volume of the loosely packed material before mixing was 31.243 cub. m., and the volume of the resultant constructions was 20.12 cub. m., or somewhat more than that of the crushed material alone.

The materials were very carefully hand-mixed, after which enough water was worked through the mixture to make a rather wet concrete, which was quickly taken and dumped into position into which it was further tamped. The work was not continued through the night but, when leaving it unfinished, the surface was roughened up, and on resuming next morning it was well sprinkled over with pure cement before the next lot was dumped on. The base block and other parts were formed up between boards, but the mortar blocks were more carefully shaped up in exact forms with interiors well soaped, and upon nearing the top, the concrete was added in smaller and smaller amounts which were carefully put into place before more was added, this care being to get a good surface free from any large pieces and not over-full. A cover was then put on and weighted down to remain over night.

Upon removal of the forms next morning, vapour rose off them, and they were perceptibly warm to the hand, the rise in actual temperature being about 20 degrees C., as determined by a thermometer, for which a hole was left in the top of a block.

The blocks were carefully washed down, and for a few days afterwards they were kept damp. Some small insignificant cracks appeared in the first blocks made, these being apparently due to contraction, and generally there was a slight sinking of about 1 mm. at the centre, but the outside dimensions were unaltered.

Beyond a good scrubbing down, very little further preparation was necessary; the surface was in every case good and true enough to allow the anvil block to be put on with only a layer of tarred blanket between, the mortar box above being seated upon a sheet of rubber.

The blocks were, of course, at once firm enough to allow the superstructure to be erected, and the stamps were allowed to drop one month afterwards, when each foundation showed itself to be satisfactory.

The cost for such foundations for ten stamps were as follows:—

	Fl.	£	s.	d.
5916 k. of cement, cost delivered	1395·36	116	5	7
75 m. of old steel rails.....	75.00	6	5	0
60 k. of band iron.....	7.20	0	12	0
150 k. of barbed wire.....	5.00	0	8	4
Wood, oil, carpenters' labour....	70.00	5	16	7
93 days coolie labor to mix, transport, and place concrete.....	93.00	7	15	0

	Fl.	£	s.	d.
6 days mason	12.00	1	0	0
6 days native overseer	15.00	1	5	0
4 days European overseer	32.00	2	13	4
Foreman's time	20.00	1	13	4
55 days' coolie labor bringing stone to crush	55.00	4	11	8
Labor, cutting rails, preparing reinforcements	15.00	1	5	0
	Fl. 1794.56	£149	10	10

From these figures it is obtained that 1 cub. m. of concrete cost fl. 89.19, or 7l. 8s. 7d., of which the cement alone fl. 69-33, or 5l. 17s. 6d.; or one cub. yd. would would take 7l. 15s. 0d.

Shortly before this work of concrete foundations was begun, thirty identical stamps, with identical mortars and anvil blocks as described, were erected and put to work on wooden blocks as part of the same battery, and the experience has been that the concrete blocks cost very considerably less both in money and in time. With these stamps on wood, a comparison with respect to crushing efficiency was made, however, from which it could not be said that the concrete foundations showed any decided superiority, as one lot of stamps appeared to do as well as the other. It was, however, noticeable that with the concrete the nuts and bolts did not so readily work themselves loose, a fact which will be mor enoticeable as the battery gets older. When, late,r the holding down bolts are drawn up into shrinking or rotting wood, or when the wood gives way to the strain on those bolts, then the cotter plates will get out of truth and bolts will be the more liable to break; the concrete gives freedom from this liability, and it may be expected that over their life those blocks will show a greater efficiency than will the wood ones.

With the wood foundations there are no mud sills as there are in the usual design for such batteries, but the streak sills are supported on masonry along their length with additional support in the middle upon posts which stand up from the concrete fundament of the blocks; this construction reduces to a minimum any springiness of these streak sills which the usual support upon mud sills allows. The king-post is also seated upon a stiffening sill which again reduces any possible vibration and provides a piece easy of renewal in case the seating of the king-post should wear or rot itself loose; this piece also occurs with the concrete foundations. Each king-post is held down by two 38 mm. (1½ in.) bolts on either side, which are held against the streak sill beneath, and which in their turn hold down a stiff bar piece which passes right through the post; during construction pocket holes were left in the masonry for convenience in inserting these bolts, which were afterwards filled up.

These notes are offered in the hope that they may be of service in other remote situations similar to that of the battery under consideration, where use has to be made of the material at hand. For new work in countries with good ordinary means of communication the design of concrete blocks as used in South Africa would be proper, to which some application of the principle of reinforcement might perhaps be added with advantage.

THE PREVENTION OF MINE EXPLOSIONS.

REPORT.

To the Honorable The Secretary of the Interior.

Sir,—In response to your request that we co-operate with the United States Geological Survey in the inauguration of its investigations looking to the prevention of mine explosions, and that we submit for the consideration of those connected with the coal-mining industry in the United States such recommendations as experience in our own countries and observation among American coal mines indicates may be useful in providing for greater safety, we beg to submit the recommendations given below.

Since coming to the United States, we have given careful attention to and approve the investigations in relation to this subject begun by the Geological Survey. We have visited typical mines in the more important coal fields of the United States, and have discussed the mining problems with many coal operators, miners, and state inspectors.

To be effective, investigations for the benefit of mining must be continuous. The opening up of new mines, the deepening of old mines, the meeting with new conditions, the changing of explosives, and the inauguration of new processes and methods will call for continuous investigations, to be followed by continuous educational work.

Our investigations and recommendations relate primarily to questions of safety in mining; but in this connection we have been greatly impressed with another closely associated phase of the industry, viz., the large and permanent loss of coal in mining operations in many portions of the United States. This is a serious, permanent, and national loss. It seems to be a natural outcome of the ease with which coal has been mined in the United States and the enormously rapid growth of the industry.

The active competition among the operators and the constant resulting effort to produce cheaper coal has often naturally led to the mining of only that part of the coal which could be brought to the surface most easily and cheaply, leaving underground, in such conditions as to be permanently lost, a considerable percentage of the total possible product. Certainly much of this loss can be prevented through the introduction of more efficient mining methods, such as the long-wall system, more or less modified, the flushing method. (See "II," 7, p. 10.)

In the preparation of these recommendations we have recognized fully the great differences between the mining conditions in Europe and those in America, where the industry has developed so rapidly that thorough organization has not yet been possible; where a large percentage of the men entering the mine are unfamiliar either with mining methods or the English language; and where the price of coal at the mine is less than half that in Europe. Nevertheless, we believe that these recommendations will be found useful in the

further development of the American coal-mining industry for safety and efficiency. The cordial reception everywhere accorded us leads us to believe that these recommendations will be received by the operators and miners in the same spirit of good will as that in which they have been prepared. But the success of this movement for greater safety and efficiency will depend upon the hearty and patient co-operation of the operators and the miners, working together for the accomplishment of this purpose.

RECOMMENDATIONS.

A. Selecting the Explosives to be Used.

(1) We recommend that the Government of the United States examine the explosives now and hereafter used in mining, with a view to eliminating the more dangerous explosives and to improving and standardizing such explosives as may be considered most suitable for such use, these to be designated by the Government "permissible explosives."

The term "permissible explosives" is suggested for the reason that no explosives are entirely safe, and all of them develop flame when ignited; and we advise therefore against the use in the United States of the terms "safety explosives" or "flameless explosives," as these terms may be misunderstood and this misunderstanding may endanger life.

(2) We recommend that the operators and miners of coal use only such explosives as are included in a list of "permissible explosives," when the same has been published by the Government, in all mines where there is risk of igniting either dust or gas, selecting that one which their own experience indicates can be used to the best advantage under local conditions.

(3) We also recommend that investigations be conducted to determine the amount of charge of such "permissible explosives" which may be used to the best advantage under different conditions with a view to reducing danger to the minimum.

B. Carrying the Explosives into the Mines.

(1) All explosives should be made into cartridges and placed in closed receptacles before being carried into the mine, and the quantity carried into the mine during one day by any miner should be limited as nearly as practicable to the quantity needed by him for use during that day. Handling loose explosives and making them into cartridges by an open light in the mine should be prevented.

(2) Detonators or caps should be handled with great care, and should be carried only by a limited number of responsible persons.

C. Use of Explosives in the Mine.

(1) Shooting in or off the solid should not be practiced.

(2) The depth of the shot hole should be less by at least 6 inches than the depth of the cutting or mining. The use of very deep shot holes should be avoided as unnecessarily dangerous.

(3) The overcharging of shots (the use of a larger charge than is required to do the work satisfactorily) should also be avoided as unnecessary and dangerous. The proper standardization of explosives used in coal mining will greatly facilitate the carrying out of this recommendation. (See also "A," 1, p. 7.)

(4) Shots should never be tamped with fine coal or material containing coal. Clay or other suitable material should be supplied and used for this purpose.

(5) The firing of two or more shots in one working place, except simultaneously by electricity, should not be allowed until a sufficient interval has elapsed between the firings to permit an examination of the working place in order to see whether any cause of danger has arisen.

(6) Before a shot is fired the fine coal should be removed from the working place, as far as practicable, and the coal dust on the floor, sides, and roof, for a distance of at least 20 yards from the place where the shot is to be fired, should be thoroughly wet, unless it has been demonstrated that the dust in the mine is not inflammable. (See also "E," 1, p. 9.)

(7) If gas is known to occur in the mine, no shot should be fired until, in addition to the watering, an examination made immediately preceding the time for firing, by a competent person, using a lamp which will easily detect 2 per cent. of gas, has shown the absence of that amount of gas from all spaces within 20 yards of the point where the shot is to be fired.

(8) Believing that such will be one of the greatest advances which can be made in safeguarding the lives of the miners, we recommend the adoption of a system of electric shot firing, in all mines where practicable, by which all shots in the mine, or in each ventilation district of the mine, may be fired simulanteously, at a time when all miners and other employees are out of the mine.

D. Keeping the Mine Roadways Clean.

(1) The roadways of the mines should be kept as free as possible from loose coal which may be ground into dust and of rubbish in which such dust may accumulate, in order to facilitate the removal and wetting of the dust.

E. Wetting the Coal Dust.

(1) In all coal mines where explosives are used it is desirable, and in all mines containing gas it is highly important, that the dust on the walls, timbers, and floors of the working places and roadways should be kept continually wet prior to and during the work in the mine. If, however, conditions of roof or lack of water render this general watering impracticable, at least the dust within 20 yards of each shot should be wet before each firing, and other precautions against explosions should be practiced with unusual care.

It is our opinion that a system of watering which occasionally sprinkles the floor only and leaves dry the dust on the walls and timbers of the roadways is useless and is also dangerous in that it may generate an unwarranted feeling of security against an explosion.

F. Special Precautions for Mines Containing Gas.

(1) In any mine where as much as 2 per cent. of gas can be detected by suitable method only locked safety lamps of an approved type should be used so long as such condition exists or is likely to recur.

All safety lamps should be maintained in good condition, cleaned, filled, kept in a special room at the surface, and carefully examined both when delivered to the miner and when returned by him at the close of each day's work. A defective safety lamp is especially dangerous because of the false feeling of security it engenders.

In the filling of lamps with benzine or other low-flash oils, which should always be done at the surface, special precautions against fire or explosions should be taken.

G. Use of Electricity.

(1) Electricity in mining operations offers so many advantages, and has been so generally adopted, that no reasonable objection can be made to its use under proper restrictions. The electrical equipment, however, should be installed, maintained, and operated with great care, and so safeguarded as to minimize danger from fire or shock. The fact that the effectiveness of some insulating materials is soon destroyed in most mines should not be lost sight of.

We recommend the following precautions: For distribution underground the voltage should not exceed 650 direct current or 500 alternating current, these voltages being intended for transmission to machinery operating at 500 volts direct current and 440 volts alternating current, respectively. Even lower voltages are preferable. The trolley wires should be installed in such manner as to render shocks least likely; that is, placed either high enough to be beyond easy reach or to one side of the track and properly protected.

Where current at a potential of more than 650 volts is employed for transmission underground, it should be transmitted by means of a completely insulated cable; and where a lead or armored covering is used, such covering should be grounded.

In all mines having electric installation special precautions should be taken against the setting on fire of coal and timber. Inclosed fuses of cut-outs are recommended, and each branch heading should be so arranged that the current may be cut off when necessary.

No live electric wire should be permitted in that part of any mine in which gas is found to the amount of 2 per cent.

In all mines producing gas in dangerous quantities, as indicated by a safety lamp which will detect 2 per cent. of gas, the working places should be examined for gas by a qualified man, using such a lamp, immediately before any electric machine is taken or operated there.

H. Precautions Against Miscellaneous Accidents.

(1) In all new construction, shaft lining and superstructures about the entrance of the shaft (or slopes or drifts) should be built as far as practicable of noncombustible materials.

About the entrances to mines, every possible precaution should be taken to prevent fires or the injury of the equipment for ventilation and haulage. Ventilating fans should be placed to one side of the mine opening, and hinged doors or light timbering should render easy the escape of the explosive force in direct line of the shaft of slope.

Proper precautions should be taken for immediately preventing the entrance into the mine of heat and gases and for facilitating the escape of the men in case of surface or shaft fires.

(2) The surface equipment for handling the coal should be so arranged as to prevent coal dust entering into the mine shaft.

(3) In all new mines, and in all old mines as far as practicable, suitable man roads should be provided for the men separate from the main haulage roads.

(4) In connection with the system of venilation it is recommended that in the more frequented roads connecting the intake with the return air centres, two doors be provided, these doors to be placed ot such a distance apart that while one is open the other is closed.

(5) In view of the large number of accidents from falls of coal or roof, under the existing practice with single props, more attention should be given to the introduction in mines where the roof is bad of better systems of timbering, such as have been long in use with economy and safety in many well managed mines.

(6) In undercutting coal by hand, the premature fall of the coal should be prevented by sprags or other suitable supports.

(7) We believe that the difficulties and dangers encountered in the working of coal seams which are thick and steeply pitching, or of which the coal is highly inflammable in character or subject to firing from spontaneous combustion, and in mines where the subsidence of the surface must be avoided, may be successfully and economically overcome in many cases through the adoption of the flushing system of mining—that is, the filling with sand or other similar materials of the space from which the coal is removed. The system originated in the United States and is now successfully practiced in portions of Germany, Austria, Belgium, and France.

I. Mine Supervision and Inspection.

(1) We can not too strongly emphasize the fact that thorough discipline about the mine is absolutely essential to safety, and that thorough discipline can be brought about only through the hearty co-operation of the operators, the miners, and the State.

(2) We are of the opinion that the responsibility for safety in the mine should primarily rest with some person, such as the manager or superintendent, clothed with full authority; and that such person can greatly facilitate the attainment of safety through the employment of a sufficient number of foremen, and also of one or more inspectors whose special duty it shall be to see that the regulations are strictly enforced.

(3) The State can not exercise too much care concerning the experience, technical training, and selection of its inspectors. Their positions should be made independent of all considerations other than that of efficiency; and their continuance in the service should be coexistent with good behavior and proper discharge of official duty.

J. Training for Mine Foremen, Inspectors, Etc.

We are of the opinion that the cause of both safety and efficiency in coal mining in the United States would be greatly aided through the establishment and maintenance in the different coal regions of special schools for the training of fire bosses, mine foremen, superintendents, and inspectors. The instruction in such schools should be practical rather than theoretical.

The work of these schools would supplement most effectively that of the colleges already established in many parts of the country for the more thorough training of mining engineers.

Respectfully submitted.

VICTOR WATTEYNE.
CARL MEISSNER.
ARTHUR DESBOROUGH.

THE NORTON HILL COLLIERY EXPLOSION.

The report of H. M. Inspector of Mines Joseph S. Martin on the Norton Hill Colliery explosion indicates that the explosion was due to the presence of coal dust. No perceptible amount of fire-damp was present. The explosion resulted in the death of ten persons. The report lays stress upon the necessity of attacking the coal-dust problem and of watering dusty sections. The conclusion is reached that if there had been even a small percentage of gas in the air the explosion would have been much more violent.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

(Continued from last issue.)

The Fire Fighting Organization and Equipment.

The Dominion Coal Co. have in the past suffered severe losses through fire, both above and below ground. In 1903 a fire occurred in Dominion No. 1 mine, and in 1906 a fire broke out in the pit bottom of the Hub Colliery. In both cases the mine had to be flooded before the fire could be extinguished. At the Hub the surface erections were all destroyed. In October, 1906, the old bankhead at Reserve was completely destroyed by fire, and in 1908 the wash plant at Port Morien was burnt down.

The monetary loss suffered by the company through these fires, while serious, was not so great as that occasioned through the stoppage of their operations. For some years past the company have been perfecting a system of fire protection, and at the present time they have an admirable and effective organization.

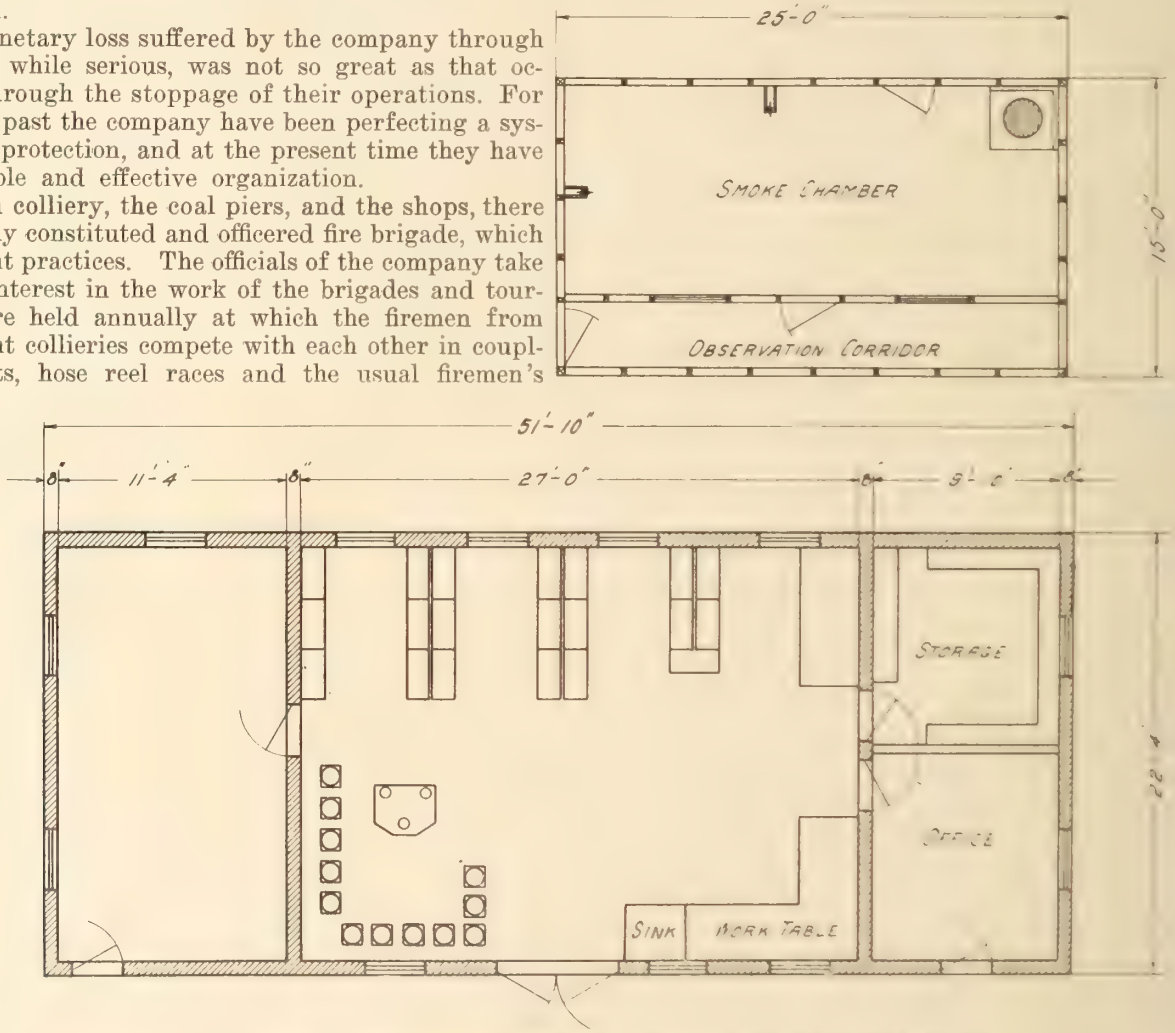
At each colliery, the coal piers, and the shops, there is a properly constituted and officered fire brigade, which has frequent practices. The officials of the company take an active interest in the work of the brigades and tournaments are held annually at which the firemen from the different collieries compete with each other in coupling contests, hose reel races and the usual firemen's sports. Each colliery also has a building, generally known as the firemen's hall, which is set apart for the social use of the firemen in the evenings. In this building is also stored the fire-fighting equipment, which consists of fire hose, reels, rubber boots, rubber coats and sou'westers.

Each colliery has a system of fire hydrants, and standpipes are placed throughout the bankheads and other large wooden structures, with coiled fire hose coupled up in readiness for instant use. The buildings are all supplied with chemical fire extinguishers, hung up in convenient situations.

Particular attention is paid to the matter of cotton-waste and oil. Drip pans are placed beneath all lubricating bearings and shafting in positions where the oil drips, keeping the wooden erections from becoming oil soaked and thus dangerous as a fire risk. Cast iron receptacles, sufficiently heavy not to be easily moved about or overturned, are provided to hold the waste. These receptacles contain two compartments, one to contain the clean waste and the other for the oily waste. Loose rubbish and oily waste are not allowed to be promiscuously thrown around.

A separate building at each colliery is provided for the storage and distribution of oil. These buildings are placed in an isolated position, and buckets of dried sand are always kept near at hand.

Particular care is taken to keep live steam pipes from coming into contact with wooden structures, and where



A—Plan of Central Rescue Station, Showing Apparatus Room, Emergency Hospital and Smoke Chamber.



Draeger Apparatus—Helmet Type.

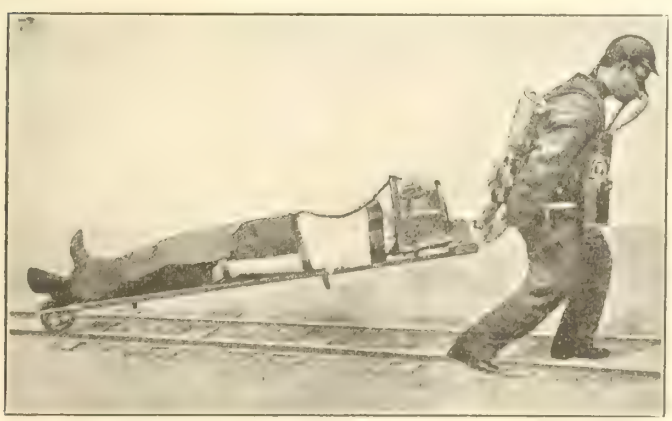
steam pipes pass through wooden partitions the wood is protected by the regulation bushing. Wherever high tension electrical current passes near timber structures instructions are given that dried sand is to be kept in a handy situation.

Similar precautions are taken underground. Where compressed air is carried into the workings arrangements are made to allow the discharge of the mine pump or some other adequate water supply to be turned into the air pipes, which thus become water mains extending into the interior of the mine. The fire stations are plainly marked, and the underground firemen, known as the Rescue Corps, are expected to know the position of these mains and connections in the same way that the surface fire brigade know the position of the colliery hydrants. Plans are kept on file showing the position of all the air and water connections both above and below ground.

In collieries where the workings are dusty, periodical sprinkling takes place, and in some instances the dust is swept up and taken out of the mine.

As on the surface, all the underground engine houses are provided with chemical fire extinguishers. Special electrical rules and warnings are placed in all electrical engine and pump houses.

One of the most interesting features of the company's scheme of fire protection is the Central Rescue Station, near No. 2 colliery. This is a substantial brick building, with concrete floor, containing four rooms. (See plan accompanying "A").



Method of transporting injured or unconscious man on oxygen stretcher.

The main room of the building contains a series of wooden cabinets (photos 1 to 5) on which are stored the breathing apparatus, which form the equipment of the station. These are all of the Draeger type, which consists briefly of a helmet, two flasks of compressed oxygen and two potash regenerator cartridges. The mode of operation may be seen from the accompanying diagram, and is shortly as follows:

The oxygen is contained in the twin cylinders at a pressure of 225 atmospheres. When released by turning the valve it passes out through a reducing valve at a pressure of 1-5 atmospheres through a side tube and into the air space of the helmet, emerging immediately in front of the mouth of the wearer. The helmet connects with two bags lying on the chest, one for the oxygenized air supply and the other for the expired air. These bags serve merely as a reservoir and to equalize the circulation. The expired air passes through a tube on the opposite side of the helmet and is passed through the re-



Draeger Apparatus—Mouth-Breathing Type.

generator cartridges. These consist of tin cylinders containing layers of finely granulated potash or shelve so arranged as to present the greatest possible superficial area of absorbing surface. The potash takes up the carbon di-oxide of the expired breath, and the purified air passes through a cooler, finally joining the main oxygen stream issuing from the cylinder. The process is continuous, and the apparatus is designed to enable the wearer to work for two hours quite independently of the nature of the outside atmosphere.

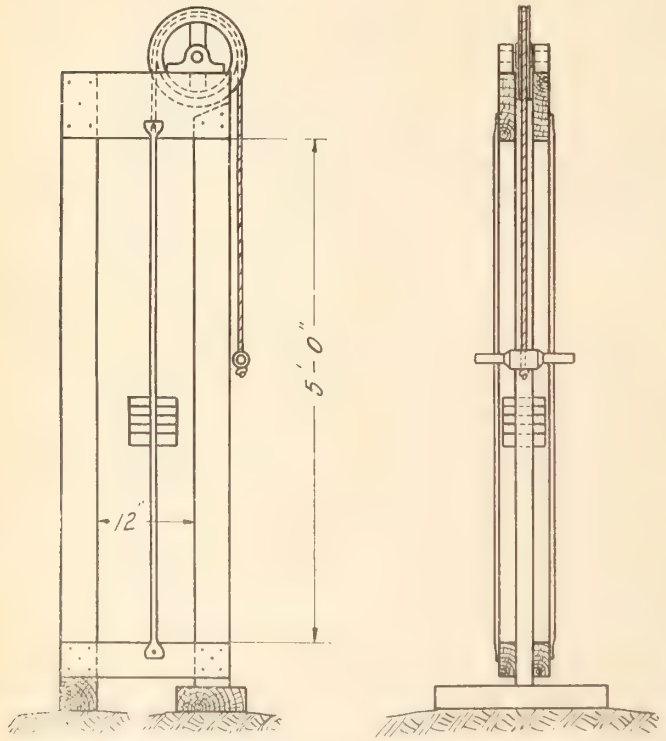
The most characteristic part of the Draeger apparatus is the helmet, which is a brass mask covering the entire face and the crown of the head, but leaving the ears free. Inside it has a collapsible rubber lining which may be inflated and deflated in the same manner as the tire of a bicycle. By inflating the pneumatic

lining the helmet can be made to fit exactly into all the crevices and curves of the facial outline, and entirely exclude the outside atmosphere. The front of the helmet consists of a large circular pane of mica which affords unobstructed vision. The entire apparatus fully charged weighs about 38 pounds.

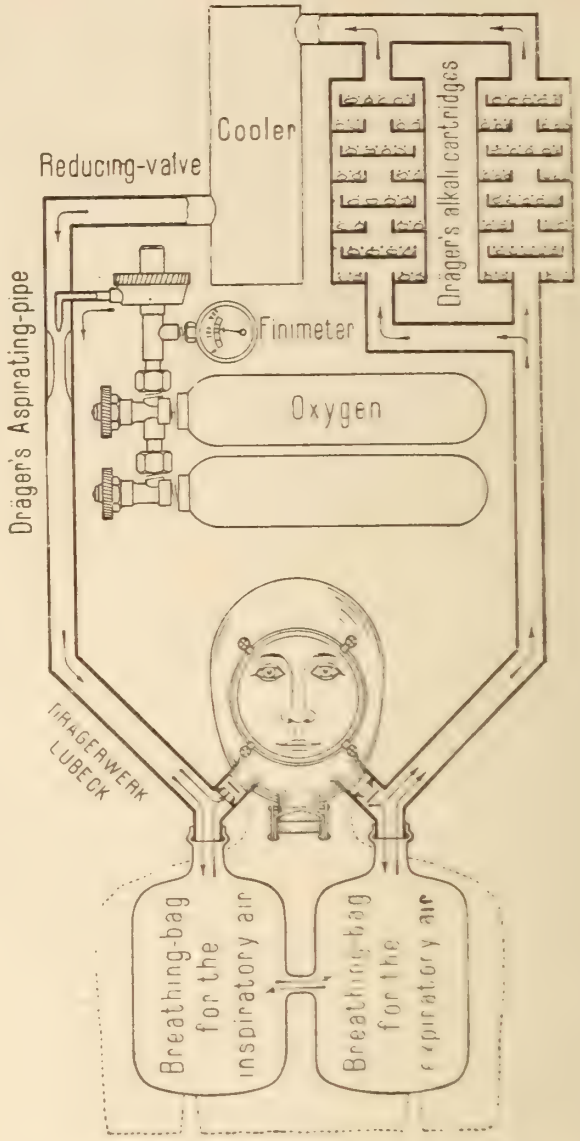
The station is equipped with 20 apparatus and 15 auxiliary sets are kept at the collieries. The oxygen supply, which is never allowed to fall below 1,000 feet, is kept in the main room in crucible steel cylinders, each holding 100 cubic feet at a pressure of 80 atmospheres. The small cylinders of the apparatus are charged by a refill pump, which compresses the oxygen from 80 atm. to 225 atm., the pressure for which the apparatus is designed. Electric hand lamps, corresponding in number to the apparatus, are kept on hand in the station, already charged for immediate use. The station has a small independent charging arrangement for the lamps, the current being obtained from the colliery wires. In addition to the Draeger apparatus the station has a Konig Smoke Helmet. This is a leather and mica hood connected by hose with a bellows to pump fresh air to the wearer. The hood has a mouthpiece, and a receiver is held by the man operating the bellows, enabling them to speak to each other. This device is useful for work in foul air at a short distance from fresh air, such as building stoppings. It was bought before the station was erected.

The station is connected by telephone, on its own special circuit, with all the collieries, and by means of an extension instrument is connected with the instructor's residence, close by the station. The instructor keeps in constant touch with the central of the coal company's private telephone system.

Adjoining the station is the practice smoke chamber. This is a rough-wooden shed, consisting of an observation corridor divided from the main building by a partition with glass windows.

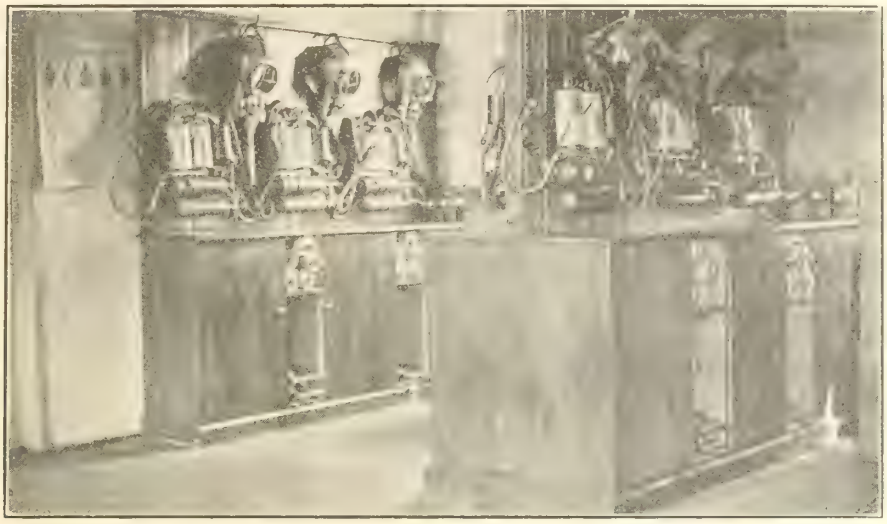


Weight and Pulley Exerciser used in the Smoke Chamber.

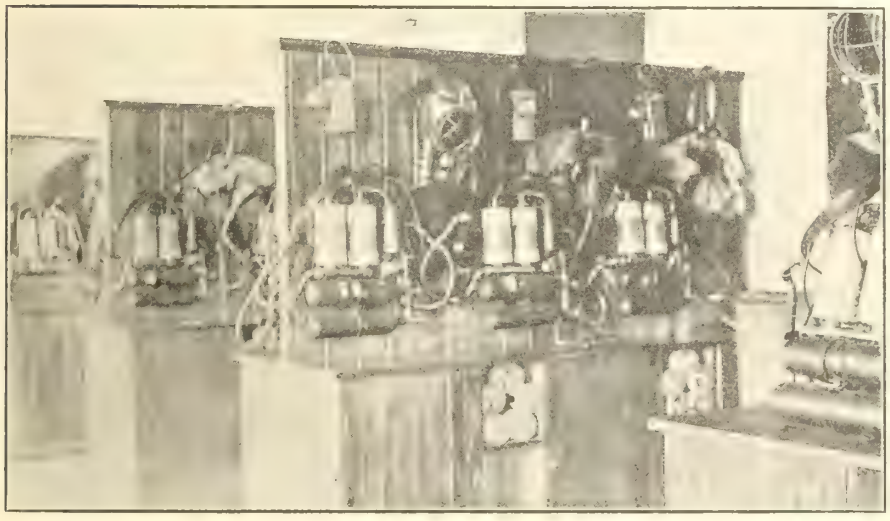


The smoke chamber proper has no windows, and has a fire grate in one corner on which materials are burnt to make a stifling smoke. There are two weight lifting machines for exercising, consisting of a rope passing over a pulley attached to a weight of 45 lbs. Men training in the use of the breathing apparatus enter the smoke wearing the apparatus and carrying electric lamps. Each man does a certain amount of work on the exercisers, and they thereby become acquainted with the working of the apparatus, and its effect upon them individually. The instructor is able to gauge the effectiveness of a man, as shown by the number of times he can lift the weight, and his behavior under the physical strain, and is able also to judge of the suitability of each man for the work. This training and testing process is quite necessary, as not all men are fitted to wear the apparatus or to perform the exhausting work which in case of emergency they will be called upon to do.

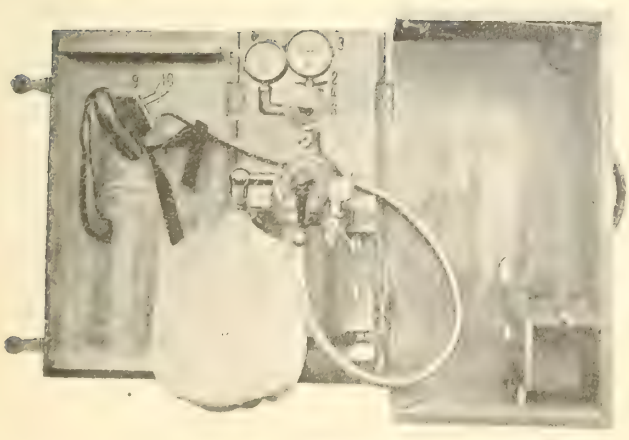
Among the equipment of the station is a "Dr. Bratt" resuscitator. This is a device for inducing artificial respiration and administering oxygen. It consists of a flask of oxygen connected by the tube with a mask for the mouth and nostrils. By moving a handle to and fro the lungs of an unconscious person may be inflated and deflated as in natural breathing. The device



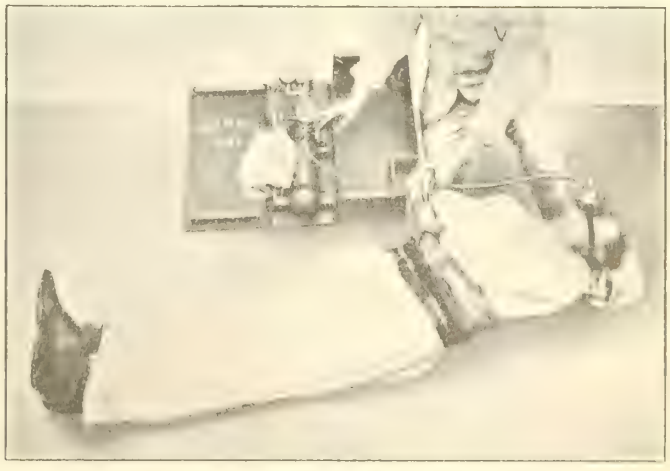
Corner of Rescue Station, showing Helmets, Back pieces, Spare Cartridges, etc., all ready for use.



View inside Rescue Station, showing the four cabinets to store 20 sets of apparatus.



"Braii" Resuscitator



Braii" Resuscit for 4[illegible]

is of special value for reviving men who have been "gassed," particularly those suffering from the carbon-monoxide poisoning which so frequently kills the survivors of a mine explosion. The station has also a auxiliary apparatus are kept at some of the outlying collieries. These are intended for use by the colliery Rescue Corps pending the arrival of a detachment from the Central Station, if this should be found necessary.



Another corner of Rescue Station, showing refill pump, portion of exercising device and 6 oxygen cylinders.

similar arrangement mounted on a special stretcher fitted with a deep grooved wheel which can be run along the mine rails, thus facilitating transport. By means of this device, in conjunction with the Draeger apparatus, it will be possible for a party of rescuers to penetrate into deadly gases, to revive the unconscious survivors and carry them to the outer air.

One end of the Rescue Station is fitted up as an emergency hospital and dressing room. It contains a wash-basin, spring couch, table and rubber sheet. First aid requisites, blankets and stimulants are kept on hand.

In addition to the apparatus in the Central Station,

The whistle signals at the different collieries, which at one time varied, have now been standardized. The ordinary whistle is used for the "work" and "no work" signals, and siren whistles only are used for fire alarm purposes. The sirens at the collieries are to be distinguished from each other by their varying pitch. The following is the standard code of signals now in use:

Fire in the mine—2 toots and a pause, repeated.

Fire on the surface, or in colliery buildings—3 toots and a pause, repeated.

Fire in the dwellings—One blast of siren, with a number of short blasts to indicate Ward number.



ONE OF THE RESCUE CORPS OF THE DOMINION COAL COMPANY. BRICK BUILDING IS ONE END OF STATION.

Each colliery has either two or three Rescue Corps, consisting of men who are resident at the colliery and acquainted with the workings. These men are chosen because of their knowledge of the underground workings, ventilation and position of air roads, pipe lines and connections, but they are first of all passed by the instructor as being suitable. The names of the men composing the corps and the periods for which they are detailed for duty are posted in the Firemen's Hall, near the apparatus. As far as possible the corps are so arranged that the trained men at one colliery shall not all be underground at the same time.

The instructor makes periodical rounds and exchanges the colliery apparatus for others that he brings from the Central Station. This is done so that the apparatus may always be in good working order.

Up to the present time (December, 1908) there has been no call upon the Central Station from the company's own mines, but a detachment of 25 men in charge of the Superintendent of No. 2 District and the Instructor went to Sydney Mines on the 11th of September, 1908, and were of considerable assistance in extinguishing a fire in Sydney No. 1 Mine, which was burning at a point 2¼ miles from the pit bottom. On this occasion both the training of the men and the effectiveness of the apparatus was put to the severest test with extremely gratifying results.

At the end of 1908 the Central Rescue Station of the Dominion Coal Company was the only one of its kind on the American continent, and it is superior in the extent of its equipment and the number of trained men to any station outside of Germany or Austria.

THE SEPARATION OF METALLIC ORES BY JIGGING.

Read before the Institution of Mining and Metallurgy, by Arthur Taylor, Member.

Where ores are carefully classified, the lowest size that can be jigged satisfactorily is above a 16-mesh sieve, and the writer thinks he is right in saying that jigging is not often applied even to such a fine size. When less careful classification is resorted to, and fine stuff is allowed to pass over a jig with the coarser, much ore is lost.

In the ordinary mechanical jig a speed of 300 rev. per minute is about the maximum, with a minimum stroke of, say, 2 mm. to 4 mm.; and even with this, there is much strain on the parts and corresponding wear and tear. The regular beat of the plunger causes too great a rush of water, and that carries upwards the minute particles of ore.

In the opinion of the writer, the finest slimes that can be treated by any mechanical means can be treated with excellent results in jigs, more conveniently, and with less working expenses and less cost in plant than by any other apparatus, provided the jigs are of a suitable construction.

In the first place the pulsating action must be reduced to a minimum, and the rapidity of the stroke increased up to the point of a simple vibration, and the supply of water should be regulated to be just sufficient to keep the matter in a state of semi-suspension, like a quicksand; enough to prevent packing and to allow of the shifting of the particles one on the other, but not enough to lift them and allow the finer particles to be carried up by the current.

A constant movement is indispensable to prevent the establishment of uneven currents, to produce an even distribution of the minerals and the water, as well as to provide the interchange of position of the particles one on the other, quite distinct from the regular rise and fall of the particles produced by the even beat of a plunger. Also a most important point is that in the case of fine slimes the vibration certainly promotes the more rapid settling from the water of the suspended matter. This diminishes the loss in the case of impalpable slimes flowing over jigs.

The writer has met the requirements of the case by a complete modification in the form of apparatus and the substitution of a vibrator for the plunger, thus suppressing the portion of the hutch in which the plunger works. The vibrator is fixed to the hutch which carries the screen; or it can be attached to the screen by arranging this so as to have free motion in the hutch.

The action of the vibrator depends on the fact that a rapidly revolving mass tends to rotate round its centre of gravity, and if the centre of rotation is uncontrolled it will coincide with the centre of gravity.

The vibrator designed by the writer is as follows: A shaft provided with weights in the form of discs or flywheels attached, and constructed in such a manner that the journals of the shaft do not coincide with the centre of gravity of the mass. On a rapid rotation being imparted to the whole, the tendency of the mass to rotate on its centre of gravity transmits the vibration through the journals and their bearings to the supports, or connecting rods, which communicate it to the required point.

The details of construction will be seen on the accompanying illustration, Fig. 1, which shows the vibrator more or less in diagrammatic form.

The steel vibrator shaft A has eccentric journals B at each end (the centre of the journal being 2 mm. from the centre of the shaft). On the shaft are firmly keyed two collars or sleeves C provided with shoulders, and on these sleeves are fixed the eccentric discs or flywheels D, the centres of which are 2 mm. from the true centres of the discs. The position of the disc in relation to the centre of the journals is regulated by turning the disc on the collar, to which it can be firmly fixed by means of bolts E. The collar is pierced by several holes, pairs of which correspond with the two on the disc in such a way that any desired amount of eccentricity can be given.

The holes are numbered so as to insure correct setting. At zero the discs are practically concentric with the journals of the shaft, at No. 4 they have the maximum eccentricity of 4 mm. In the centre of the shaft is fixed the driving pulley F, the boss of which is also eccentric and provided with several keyways in order that it can be set in such a position that it will rotate as nearly as possible concentrically.

The vibrator is supported on two spring connecting rods H. They are forged out of one piece of spring steel and provided with metal bushings I. The two bushings are practically the only parts in the whole apparatus subject to any wear, and they will last several months if made of ordinary white metal.

The connecting rods are firmly bolted to crossbars or bridge pieces K fixed to the sides of the hutch L. The method of attachment and the relative position of the vibrator and hutch are shown in Figs. 2, 3, and 4.

The hutch L is a hopper-shaped box from 60 to 75 cm. long and 35 to 40 cm. wide. The upper part is parallel and built of 3 or 4 mm. steel plate. The lower part, hopper-shaped, is of the same material but thinner. The two large sides of the hopper are rendered flexible by the insertion of sheets of india-rubber or strong canvas, M, to allow of the freer vibration or pulsation of the hutch by liberating it from the inertia of the mass of water. A trial was made of a hopper constructed of very thin steel or phosphor-bronze plates, but, although they worked satisfactorily, the metal could not stand the strain, and at the end of a few weeks the plates would crack or break away from the thickness of the bed above the grating. In some cases, such as when there are more than two jigs in a set, or in dealing with very firm slimes, it has been found advantageous to draw off part of the water coming off the jig apart from the material under treatment. If this was not done, the increased flow of water over the lower jigs in the set would carry the ore away. The lip can therefore be made in two stages. Above the lower one are placed a series of holes through which the material escapes with a certain quantity of water and flows into the next jig, while the superabundant water flows over the top lip and is conducted away to waste. This arrangement also has the advantage of checking the flow and leaving a certain depth of water on the bed.

The wire gauze of the screen should be far coarser than the material under treatment, say, 10 mesh for stuff passed through a 14-mesh sieve, and never less than 50, even for stuff that will pass through a 250 mesh, that is to say, the finest slimes. On the gauze screen is placed a thin bed, from 25 to 50 mm. deep, of lead shot, "small dust" for the finest ores, up to Nos. 6 or 8 for the coarser sizes. On the shot is placed the

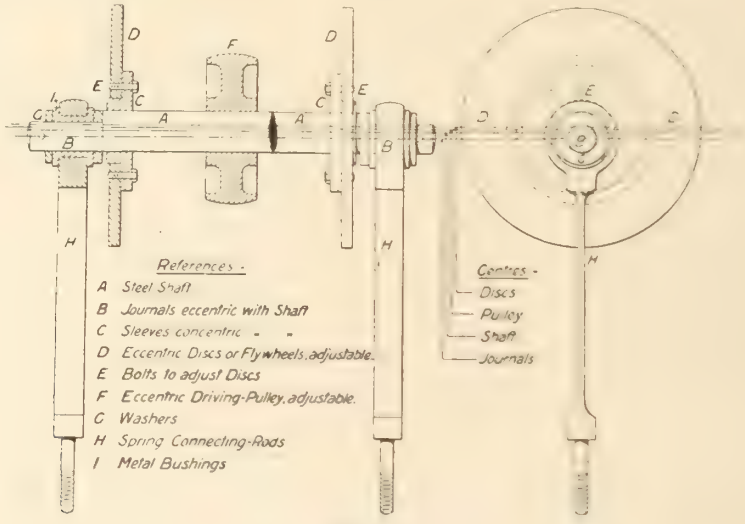


Fig. 1

the rivets. At the bottom of the hopper is a valve N for drawing off the concentrates.

On the sides of the hutch are four rectangular lugs or supports O, on which the whole apparatus is hung, on two parallel beams, P. Four bolts or spindles are fixed in the beams, passing through holes in the lugs to keep the whole in place, the lugs being supported by stiff spiral steel or india-rubber springs, both above and below. In Fig. 2 are shown the alternative fittings with spiral and india-rubber springs. On the spindles are nuts to tighten or loosen the springs as may be required for the proper working.

Inside the hutch at the top of the hopper is a ledge on which is supported a cast steel grating R, which carries the wire gauze, with another similar grating above to keep it in place, all being firmly fixed with hardwood wedges and iron lugs on the inside of the hutch. Around the grating is packed with slips of soft wood or cord to prevent leakage.

At one end of the hopper and under the grating is fixed a short pipe S, connected by a flexible tube to a tap, for the introduction of water.

An overflow lip T is placed at one end of the hutch, arranged so that it can be raised or lowered to regulate true bed on which the separation takes place. The chief use of the shot is to keep the bed off the screen, as it would otherwise get choked, and it allows of a much coarser gauze being used.

The construction of these jigs is entirely the same for coarse or fine ore, and all parts should be interchangeable, the only exception being that the discs are made heavier for the coarser ores, the weights varying from 2½ k. to 5 k., the lighter ones being driven at about 1,500 rev. a minute, with perhaps 1 mm. eccentricity, the heavier ones at 500 rev. with the maximum of 4 mm. eccentricity. Of course, the length of stroke is far less than the amount of the eccentricity. The speed is governed by the size of the pulleys driving each jig and is not adjustable.

The most important and entirely new features in the construction consist in obtaining the required movement by a rapidly rotating eccentrically balanced weight, so constructed that it can be adjusted with ease and rapidity. The revolving weight is only supported on two journals. There are no cranks, eccentric straps, or other moving parts held rigidly to a bed or other fixtures by bearings and supports. The spring connecting rods allow of free uncontrolled lateral vibra-

tion, and only transmit the required vertical vibration. There are thus only two bearings subject to wear. The whole of the power is usefully applied, none is lost in rigidly-held parts transmitting thrust and vibration to bedplates, supporting frames or other surroundings.

The whole apparatus is hung on springs, and has to vibrate. It may be objected that it will require considerable power to set in motion the whole weight of the hutch, the water and the heavy charge it contains. This is not the case. The hutch, which is not heavy, vibrates independently. That is to say, that at the down stroke it is relieved of the weight of water and ore, etc. The flexible sides of the hopper bulge inwards as it comes down, the grating being forced down into the water, and the bed remains suspended. On the up-stroke the water returns through the grating and the flexible sides bulge outwards and the bed comes down into the grating. There can be no doubt that should the vibrator be fixed to a solid "dead" mass of the same weight, the power required would be incomparably greater.

Other modifications of the principle have been constructed and proposed, as, for instance, a flexible joint, V, connecting the upper and lower parts of the hutch, as shown in Fig. 2, instead of the flexible sides. This works well and is especially useful for coarser material where the stroke should be larger and slower. Another modification is to have the vibrator attached simply to a frame in which is fixed the screen. The frame is hung on springs, and is partially submerged in the hutch of water, as in the old hand jigs, the waste being carried off over a flexible overflow attached both to the hutch and the frame. (See Fig. 3.) This gave excellent results, but is not such a neat and compact apparatus.

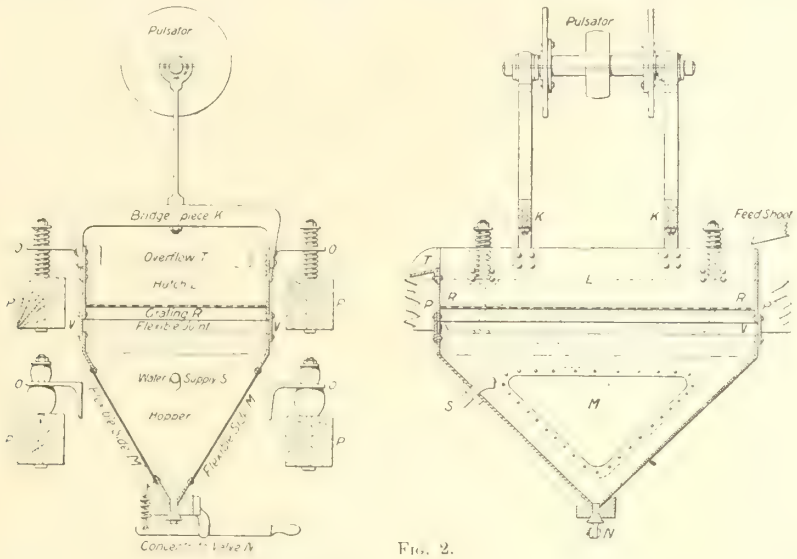
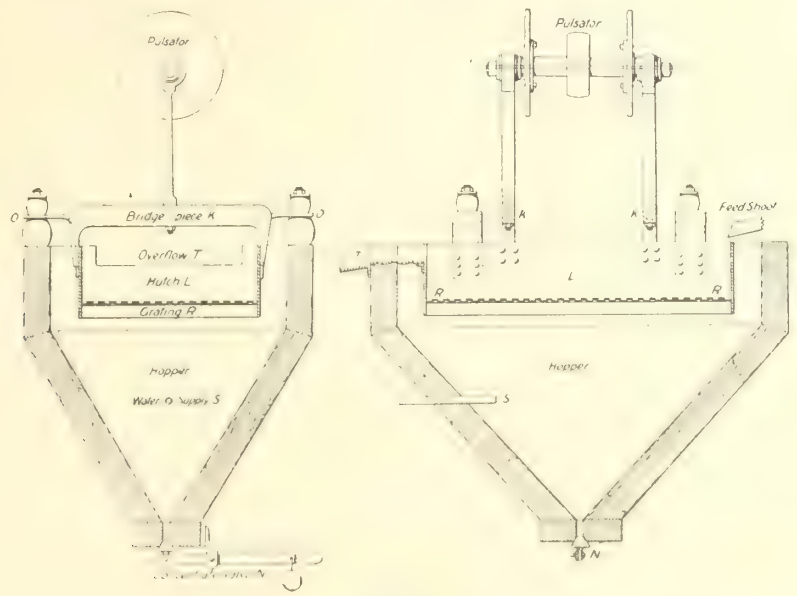


FIG. 2.

NOTE.—The flexible sides MM and flexible joint V are alternative, and are not employed together.



Another proposed modification is the application of the vibrator to a plunger in a jig of similar construction to those in general use. This modification is shown in Fig. 4, and would be designed to work with a much heavier vibrator at a slower rate of speed.

Before going into further details as to the working of these jigs it will be well to describe the nature of

the stuff they have been treating and the generol conditions under which the concentration of ore is carried on at the Calamon Mine, near Cordoba, Spain, where the trials were made.

The ore as it comes from the mine is composed of galena and blende in the proportion of about 1 of the former to 4 of the latter, mixed with carbonate of lime, slate and clay, as well as small quantities of carbonate of lead, iron pyrites, quartz, etc. The carbonate of lead is troublesome, as much of it goes with the blende, also sometimes the slate is impregnated with the carbonates and tends to give an undue lead assay in the waste. The small quantity of iron pyrites goes mostly with the galena, but it is a negligible quantity.

The quartz is generally hard and flinty, impregnated with blende, and often closely resembles good blende, though only containing 5 to 20% zinc. This tends to lower the value of the blende and raise the zinc contents of the waste. The lodes being very soft, there is an exceptionally large proportion of fine ore and slimes. As the galena and blende are somewhat intimately mixed, fine crushing is necessary. The galena is

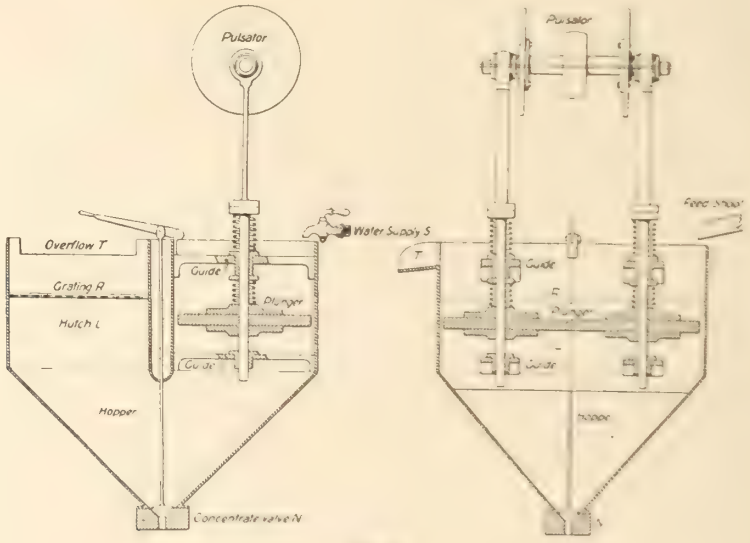


Fig. 1

concentration up to an average of 70% of lead and 7‰ of silver; the blende is 40% zinc and 1.5‰ of silver. It will be understood that with such valuable products most careful manipulation and every effort to prevent loss are necessary.

The writer was entrusted with the designing and erection of a concentrating plant to deal with these ores. The plant consisted of the usual grizzley, stone-breaker, crusher rolls, classifying trommels, machine jigs, spitzkasten and round buddles. The ore passes automatically by gravity through the whole series. A secondary complete plant deals with the secondary products. To obtain as clean a separation of the galena and blende as possible, a very careful classification was adopted and the stuff divided into eight sizes for jigging in eight four-compartment jigs of the ordinary plunger type, the first jigs treating stuff under 12 mm. and the last taking stuff passed through a 14-mesh gauze and through a spitzkasten. Thus the last jig of the old type treats stuff below 1mm., a large proportion, the galena especially, being very fine for that class of jig. Originally the stuff from over this first spitzkasten passed into another feeding the first buddle and flowing on over three ordinary conical slime separators, of increasing dimensions, each feeding a round buddle, and finally to clarifying pits.

All the jigs give clean galena in the 1st compartment, mixed galena and blende in the 2nd, clean blende in the 3rd, and mixed ore and waste ore chatts in the 4th. The waste contains about ½% of lead and 2% of zinc. The clean ore goes straight to the stores. The mixed galena and blende are first treated by hand in a jig, and give a good proportion of clean ore of each class, the true mixed ore is crushed and re-treated in the secondary plant. The chatts from the 4th compartment are all put through the secondary plant. The stuff from the buddles had all to be re-treated, even the "tails" required to be passed a second time. The "middles" and "heads" had to be treated over many times and finally washed by hand in strips or sluices to get even a fair separation of the galena and blende.

The average amount of stuff passed through the floors per day of 9 hours is 80 to 90 tons. The amount of water required is 4 or 5 cub. m. per minute, the greater part of which water is returned by centrifugal pumps after clarifying. The whole of the plant is driven by a 100 hp. high and low-pressure condensing engine.

The want of a better system of treating the slimes provided an excellent opportunity to the writer to apply the use of his new jig. Experiments were first made with a single jig. The results were so satisfactory that it was at once decided to put up a complete installation of 4 sets of 4 jigs; each set corresponding to one large jig of 4 compartments of the ordinary type. They were placed to take the stuff passing over the spitzkasten supplying the last large jig., i.e., the stuff which was before sent on to the buddles, being all the sand and slimes below 14 mesh, deprived of the greater part of their coarser ore and the coarsest sand.

By the time the stuff arrives at this point there is a large quantity of water to deal with, as at each successive operation some water is added from the grizzley down to the spitzkasten of the last large jig. The spitzkasten have, therefore, to be of large dimensions.

A separate spitzkasten supplies each set of 4 little jigs with a different size stuff; the 1st coarse silt, the 2nd fine silt, the 3rd finest silt, and the 4th almost mud.

Naturally, on account of the action of the spitzkasten, the galena contained in the different sizes of stuff is far finer than the waste. Even in the 1st jig nearly the whole of the galena will pass through a 40-mesh sieve and a large proportion through a 100 mesh. That from the last jig will nearly all pass through a 100-mesh sieve, and 50% of it through a 250 mesh.

The galena obtained runs from 75% to 65% of lead with 5 to 10% of zinc, and the blende from 45 to 30% zinc and from 5 to 10% lead. The proportion of lead and zinc in the mixed ores from the 2nd jigs varies much. The ores are separated as far as possible by hand washing. The product from the 4th jigs is turned back to pass through the same jigs again or to the secondary plant.

The waste contains about 2½% of lead and 3 and 4% of zinc. Nearly the whole of the lead contained is in an impalpable powder, for if sifted on a 250-mesh sieve, that which passes through will assay as much as 12% and what remains in the sieve only ½%.

The amount of stuff treated in these 4 sets of small jigs is from 750 to 1,000 k. per hour. They complete a consecutive series treating 12 different sizes in which the first 8 are 4-compartment jigs of the ordinary type and 4 sets of the little jigs (each set of 4 corresponding to one 4-compartment jig), beginning with 12 mm. down to below 250 mesh. The whole of the 80 to 90 tons per day is treated in the series. The average assay of the waste is less than 1% of lead, most of which is practically irrecoverable.

It may be added that the mud that will not settle in a conical slime separator 2 m. square is collected in large clarifiers and settling pits, and assays 8% of lead, 5% of zinc and 1.5‰ k. of silver. This is dried, burnt and sold to the smelters.

The cost of running the little jigs is small, two men and two boys being sufficient to run the series of 16. The power required is estimated roughly to be about 1-3 hp. per jig, or, say, 5 hp. for 16. About ½ cub. m. of water is required per minute over and above that coming down with the stuff. The cost of lubrication and repairs is also light, as there are few parts to wear, and those cheaply renewed.

Recently another complete series of 16 jigs has been erected in such a manner that they can either form part of the secondary set of jigs for treating the by-products or else be used apart for re-treating fine products from other sources, or for experimental purposes. The arrangement is the same as in the first set. They dress stuff below 14 mesh at the rate of 1 ton dry per hour. With coarse stuff the quantity would be greater. For some time they were profitably employed re-treating old dumps from the tails of buddles. In this case 50% of the galena recovered will pass through a 100 mesh. The waste carries 2½% lead, but 50% of that would pass through a 250 mesh, and 75% through a 100 mesh.

There is no doubt that these jigs will work admirably with sizes up to 8 or 10 mesh or even higher, especially as in these grades classification can be made according to size by sifting.

The jigs occupy but little space, in fact, little more than the useful surface of the grating. Complete they weigh from 40 to 50 k. each, and are thus easy to transport, and pay but little import duty in foreign customs. They can be managed by any intelligent operator, although, like all other concentrating plant, they require care and attention, especially at first. They should be applicable to all classes of ore in which the differences of specific gravity will allow separation by weight. Sizing is not all-important, although advantageous, especially in the separation of ores of little difference in specific gravity. If a classification by size could be satisfactorily made in the material for the finer sizes, in the place of the spitzkasten, there is no doubt that the separation would be nearly perfect.

The writer is confident that with some little modification the aparatus described should be applicable to the washing of very small coal. Experiments will shortly be carried out with that end in view.

EXCHANGES.

Mines and Minerals, November, 1908.—Dr. A. M. Comery, director of the Du Pont Laboratory at Chester, Pa., writes most interestingly of safety blasting explosives in Mines and Minerals for November. The term "safety explosive" is relative. A charge of 1-6 ounce of black powder may bring about a gas explosion, while under similar conditions a charge of 2 pounds of carbonite can be used with impunity.

The compulsory use of safety powders in all Belgian coal mines has reduced the number of deaths by gas or dust explosions per 100,000 miners employed from 24.5 to zero.

There are three classes of safety powders:—

1. Those containing large quantities of volatile salts.
2. Nitrate of ammonia explosives.
3. Nitro-glycerine powders.

Carbonite is the principal example of the last class. It is a slower explosive than dynamite, gives less flame, and generates less heat. It is not affected by moisture, and will detonate with a small cap.

The tests to which explosives are subjected are highly interesting. One test for strength is performed in the ballistic mortar, a device by which the recoil of a suspended steel mortar is measured on a circular scale. To determine the safety of a powder the temperature and heat of detonation are measured, the length and height of flame, the duration of flame, and the velocity of detonation.

Mining and Scientific Press, October 31st, 1908.—The Robinson mine, near Johannesburg, Sopth Africa, is the most productive gold mine in the world. Mr. J. B. Pritchard presents some facts about it in the current number of the Mining and Scientific Press. The Robinson, from a total production of 2,711,345 ounces of gold, has paid $30,000,000 in dividends. Crushing was commenced in January, 1888. In that year 7,486 tons of ore yielded 22,345 ounces of gold, an average of 59.70 dwt. per ton. Ten stamps were then dropping. The history of development is epitomized in the contrasting returns for 1907. In that year 410,927 tons of ore yielded 303,801 ounces of gold, an average per ton of ore of 14.79 dwt. Two hundred and ten stamps are now in commission. The rate of dividend payments has increased from 5 per cent. in 1888 to 24 per cent. in 1907.

The Colliery Guardian, October 23rd, 1908.—Mr. James Ashworth, in a letter to the Guardian, discusses the influence of damp air on coal dust. After pointing out the impracticability of dampening dust in a coal mine by saturating the air with moisture, Mr. Ashworth states that he "would like to have the term 'dry

air' defined authoritatively, because if air is absolutely dry no explosion is possible, but as it cannot be rendered absolutely dry, the best mode of procedure is to do as is already done in the deep mines of this country, viz., to reduce spraying to a sanitary point and thus preserve the health of our underground labor without attempting the impossible task of limiting a possible explosion by any application of water."

The South African Mining Journal, Oct. 3, 1908.— In answering enquiries concerning the most suitable form of crushing equipment for small tributing propositions, the South African Mining Journal states that small mine workers in Rhodesia favor Tremain steam stamp mills and Chilian mills. The Tremain mill weighs but 4,100 pounds. Its capacity ranges from eight to twenty tons of ore per day. It requires no engine since it is direct connected. It is self-contained and requires no frame. It can be erected speedily and as speedily dismantled. It is claimed to be an ideal mill for the prospector. In charterland, Chilian mills are greatly in favor on large and small properties.

The Mexican Mining Journal, November, 1908.— According to the Mexican Mining Journal, the deletion of Article 144 of the new Mexican mining law was due largely to "the vigorous and remarkable campaign against the law which has been waged since May by the mining interests of the country, and by those who saw the necessity of encouraging the continued investment of foreign capital for the development of Mexico's great and unrealized resources. . . . The future will demonstrate the wisdom, expediency, and necessity of the action which the Government has taken in this matter."

PERSONAL AND GENERAL.

Mr. A. J. McMillan, managing director of the Le Roi, has left for England.

Mr. W. Carlyle is expected to pay a visit to Le Roi Mine, Rossland, B.C., early in the new year.

Dr. Milton L. Hersey is visiting Toronto on business connected with the testing of railroad supplies.

Dr. Barrett, medical officer for the Guggenheims in the Yukon, is visiting Kingston, his former home.

Dr. R. W. Brock, acting director of the Canadian Geological Survey, returned to Ottawa on Oct. 28 from a three-months' visit to British Columbia.

Mr. H. W. Hardinge, of New York, has returned from Cobalt where he superintended the installation of a specially devised concentrator on the Cobalt Central property.

Mr. Robt. Mond, son of Dr. Ludwig Mond, and a prominent British metallurgist, was in Toronto recently on his return trip to England, after a three-weeks' visit to the Sudbury nickel district in connection with important experiments now in progress in the electrical treatment of nickel-copper ore.

INDUSTRIAL PAGE.

THE SULLIVAN CORLISS STRAIGHT LINE AIR COMPRESSOR.

This machine consists of a tandem compound steam engine, equipped with full Corliss valve gear on both high and low pressure cylinders, connected to and operating the two stage air cylinders, which are mounted on a frame, together with the fly-wheels, forming a "straight line" machine. This air compressor embodies the most desirable features of both the Corliss cross compound and the straight line types of construction.

The reason for adopting Corliss valve gear for this machine is that it is much more economical in steam consumption than the slide valve, with the Meyer hand adjustable cut-off. In air compressor practice the demand for air and the steam pressure vary constantly. The Corliss engine is equipped with an automatic dashpot cut-off, under the control of the engine governor, which regulates the admission of steam to the cylinders, and, therefore, the steam consumption, exactly to the load, viz., the demand for air, and the steam pressure.

Slide valve engines are fitted with a cut-off regulated by hand, which may be set at any desired point, but cannot adapt itself to changing conditions. Under the circumstances of a test, the steam pressure and air requirements are constant, so that the cut-off may be set at a point which will give favorable steam economy. But in ordinary, every-day service these factors are constantly varying. They may be low or high together, or their extremes may oppose each other, and it is on this account that the Corliss valve gear, with its automatic regulation, secures so much high efficiency.

As an indication of the steam economy of the Corliss compressor it may be said that when operating condensing, a horsepower may be generated on 14 to 16 pounds of feed water per hour, and on 20 to 22 pounds when running non-condensing. This means that the Corliss machine will use one-third to two-thirds less coal in the course of a year than the compressor with hand regulation, resulting in a saving, in that time, often sufficient to more than pay the difference in cost between the slide valve and the Corliss machine. When new plants are being installed the boiler capacity to be figured on for the Corliss type will be much less than that needed for a slide valve machine, and this item must also be taken into account. To put it in other words, the Temiskaming compressor will need a 185 hp. boiler, while a simple slide valve compressor with two-stage air cylinders, of equal capacity, requires a 295 hp. boiler.

The expense of a Corliss cross-compound plant frequently causes intending purchasers to install the less costly slide valve compressors, even when the high price of fuel renders strict economy of steam desirable. The Sullivan Class "WC" Compressor overcomes this objection, by reason of the well known structural economy of the straight line type, as compared with the duplex pattern.

The former type avoids duplication of heavy parts, such as frames, crossheads, and bearings, and lighter construction is permissible because the strains are direct

and continuous, instead of indirect and intermittent, as in duplex machines. Friction is diminished, because of the smaller number of working parts. Straight line compressors are simple and compact, and require less than one-half the house-room and foundations needed by duplex machines.

The compressor purchased by the City of Cobalt Company has a capacity of 909 cubic feet of free air per minute at 125 R.P.M. The Temiskaming machine will deliver 1,843 feet of air per minute at 100 R.P.M. Both machines compress to 90 lbs. per square inch.

The Sullivan Class "WC" Compressors, as has been stated above, consist of tandem compound steam cylinders, connected by massive cone-shaped distance pieces, in rear of which are attached the high pressure and low pressure air cylinders, crosshead and fly-wheels, mounted on a substantial iron frame. The piston rods for all four cylinders are attached, end to end, in a straight line by couplings, which permit the clearance in the cylinders to be adjusted.

The steam valve gear on both high and low pressure cylinders is of the Corliss type, with dash-pot cut-off under control of a speed and pressure governor. When the speed of the compressor reaches a point at which the air supply exceeds the demand, the speed element of this governor slows the machine down. Also, when the air pressure exceeds the point at which the pressure element is set to act, this element operates to reduce the speed of the compressor at its most economical point.

Steam passes from the high pressure to the low pressure cylinder through a pipe conduit of large diameter, heavily covered with con-conducting material.

The steam and air ends of the compressor are connected by means of a heavy foot plate and tie rods.

The inlet valves on both air cylinders are rolling valves, driven from an eccentric on the fly-wheel, through steel motion rods. The discharge valves are of the automatic poppet type, located in the cylinder heads, and so arranged that they can be removed, together with their seats, or cages, by hand, for inspection or regrinding. The design of the air cylinders, ports, and valves, is such as to reduce the elements of clearance, heating, and leakage to the smallest possible amounts, thus securing high volumetric efficiency.

The water jackets on the compressor cylinders are of unusual area, and the intercooler, through which the air passes from the low pressure to the high pressure cylinder, is so arranged that the air passes back and forth a number of times across the cold water tubes, thereby reducing its temperature to an unusually low point.

All working parts of these compressors are readily accessible while the machine is in operation. There are no parts inside the fly-wheels which require the attention of the engineer when the machine is running.

The system of oilers and lubricators on these compressors is very complete and convenient. Sight feed lubricators are employed for the cylinders and principal bearings, and other parts are oiled from a central cluster of oilers at a point convenient for the engineer.

The compressors of this class are built very substantially. All bearing surfaces are of large dimensions, and the frame, fly-wheels, crosshead, etc., are of unusual weight and solidity. These compressors will run continuously for long periods, and require only usual attention and care.

Compressors (Air and Gasoline). Canadian Rand Company, Limited...This excellently done catalogue is designed as an aid to purchasers and operators. In addition to the usual trade list of specifications, etc., there are pages of information that will prove invaluable to workers. On pages 10 and 11 are outlined the requirements, initial costs, and operating costs of compressed air installations of various sizes. There follows two pages on "Altitude Compression," in which a table of relative volumetric efficiencies is included. Following this the integral parts of the air compressor are dealt with in order. The description of the large range of types is thorough and clear. The catalogue is a credit to all concerned.

Catalogue No. 5 of the American Spiral Pipe Works, Chicago, Ill., has been received. This company manufactures, among other specialties, Taylor's spiral riveted pipe and forged steel flanges. In manufacturing this pipe, a strip of sheet steel is wound into helical shape with one edge overlapping the other for riveting the seam. The sheet is drawn and formed in such manner that a metal to metal contact in the spiral seam is obtained stretching the steel on the outer lap slightly offset, in order that pipe may be more nearly smooth inside. The riveting is done cold under enormous pressure, and not by percussion, thus insuring complete filling of the rivet holes with slight countersink. The pipe comes from the machines in a continuous piece, and is cut to any desired length.

Electrical Mining is a monthly pamphlet published by the Electrical Mining Publishing Company, Chicago. It is devoted to the interests of electric mine equipment, more especially that manufactured by the Goodman Manufacturing Company, Chicago, Ill. Each number describes the equipment and working features of some one large coal mine. The information given is timely and instructive.

Catalogue No. 127 of the Buffalo Forge Company, Buffalo, N.Y., is an exceedingly creditable publication. It deals fully with the heating, ventilating, humidifying, and drying devices of the above company.

Heretofore infusorial earth has been largely used for abrasive purposes, in the form of polishing powders, scouring soaps, etc., but of late its uses have been considerably extended. Its porous nature has adapted it to use in the manufacture of dynamite, as a holder of nitroglycerin. This same structure renders it a non-conductor of heat, and this property in connection with its light weight, has extended its use as a packing material in safes, steam pipes, and boilers, and as a fireproof material in general. In southern California the material is quarried for building stone, for which purpose it seems to be well adapted in that region of earth tremors. The Missouri tripoli finds its most important use in the manufacture of filter stones, but it is also ground and utilized as an abrasive. The Illinois product, called "silica" by the Illinois Geological Survey, but considered as tripoli for the reason that its origin is regarded as essentially the same as that usually assigned to the Missouri tripoli, is employed in the paint industry, as a wood filler, for enameling purposes, etc.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

St. Lawrence Shipments.

Glace Bay, Nov. 5.—Delays to shipping were numerous and persistent throughout the whole of October. A combination of forest fires and fogs brought about a condition of affairs that has probably never occurred before. The outputs of the Dominion Coal Co. were much curtailed in consequence, and amounted only to 265,000 tons, which is 80,000 tons less than were raised in October, 1907.

Sympathy or Superstition.

A regrettable fatal accident occurred recently at Sydney No. 1 Colliery, in connection with which the following resolution was passed by Drummond P.W.A. Lodge: Whereas the body of our late brother was taken out of the mine by means of the endless haulage, as if a dead miner deserved no more reverence than a dead horse. All this with an eye to cause the least possible loss of coal to the company, at the expense of degrading our dead brother and humiliating his fellow-workmen; whereas, The Nova Scotia Steel & Coal Company broke its agreement with the men in trying to hide from the miners of No. 1 Colliery on Thursday last the fact that one of their fellows had met a sudden and fearful death, and thus sordidly tried to increase its gains at the expense of beating down the natural sympathy that our common humanity feels and would give expression to, by suspending the chase after material gains in the presence of such a calamity to a fellow human being. Therefore, be it resolved: That Drummond Lodge will in future, should such an accident occur, and the management act as it has done in this case, throw the mine entirely idle till after the funeral of the deceased.

Be it further resolved that a copy of this resolution be placed in the minutes and another sent to the management of the Nova Scotia Steel & Coal Co.; also copies be sent to the press.

Is there any real justification for the common practice of laying a mine idle whenever a fatal accident occurs? We think not. It does not help the poor fellow who has gone to his last account. It does not help the widow, nor does it provide for the children. Would it not be more to the point if work were continued and that portion of the wages which otherwise remain unearned were given to those who, through the accident, might be brought to poverty? Such a procedure would be practical sympathy, the kind of sympathy that working men should extend to their fellows. Conditions are better in this respect than they used to be. At one time after the occurrence of a fatal accident the mine would not resume work until the funeral had taken place, causing two and three days successive idleness. It is but natural that colliery officials should endeavor to hide the news of a fatal accident, because they know that it will be the signal for all hands to leave work. This attitude of the colliery officials is forced upon them by the custom referred to. We do not think, however, that any of the Cape Breton mine officials would be guilty of irreverence to the dead, for the great majority of them are men who have wielded the pick themselves, and their sympathies are not extinguished because they bear official titles. The news of a fatal accident is at first known only to the workers in a small section of the mine and the majority of the men underground would finish their shift without this knowledge did not some person circulate the news around the mine. It is but natural that the immediate witnesses of an accident or the men in the section affected should wish to leave their work, but no argument can be adduced why everyone in the mine should go out, or should be told of the fact. We think that much more practical and effective ways of expressing sympathy can be found. The present custom is not an expression of sympathy. It is rather the slavish and unthinking following of a custom that has become a superstition.

Keir Hardie vs. John Burns.—Reference was made in these columns to the recent visit of Mr. Kier Hardie to Glace Bay. This same gentleman has been telling the British House of Commons that he was going to take the stump among the Suffragettes to wake the country from its lethargy. From recent events one would hardly imagine that the ladies in question needed any help from Mr. Hardie. In view of Mr. Hardie's solicitude for the workless and the starving in England—and they are a mighty army—we wonder why he should stay at the "Sydney" when down here. Would not a cheaper hotel have served the purpose of a gentleman who refuses to press his pants because he poses as a "workingman"? Mr. Burns gave this globe-trotting firebrand a rather cold crack recently when he informed Mr. Hardie that he (Mr. Burns) had been arranging relief works in Mr. Hardie's own constituency while that same gentleman was making the grand tour. We hope Mr. Hardie will take the hint and stay at home. He may be needed there, but he certainly is not needed here.

"Breathers" or "Pneumataphors."—Now that oxygen breathing apparatus are coming into a well-deserved prominence the need is being felt of some suitable and comprehensive name that can be applied to all types of mine rescue apparatus. At present one hardly knows what to call them "for short." Several prominent gentlemen in England seem to favor the word "pneumataphor." Prof. Redmayne uses this word in his Report on the Hamstead Fire. Mr. Blake Walker, of the Tankersley Station, used the word in a paper read recently before the Institution of Mining Engineers in Edinborough. Other names are legion. We have, for instance, "oxygen breathing apparatus." This represents one distinct type of apparatus. Then there is the "Pneumatogen" and the liquid air apparatus "Aerolith." Proprietary names will tend to become fixed in certain districts according to the type of apparatus introduced in the first instance. For example, here in Glace Bay the word "Draeger" is being used to describe all and sundry, although it is but one particular make of one type of breathing apparatus. The general name "breather" has been suggested, and although it may not be the best word, yet it is properly derived English, and describes generally the main object of all of these breathing devices. The word "respirator" has been appropriated for another purpose and is not available for our present needs. A word is required which the layman can understand and at which the learned grammarian will not recoil, nor the unlettered miner laugh. We therefore suggest the word "breather" as a generic term to include all types of self-contained breathing apparatus for supporting life in irrespirable atmospheres.

ONTARIO.

Montreal River—Silver Lake Mining Company, Limited.—Mining operations have recently been commenced by the above named company on properties situated at Silver Lake, which lies about six miles west of Elk Lake City, in the Montreal River Mining Division. The manager, A. G. McNaughton (brother of G. F. McNaughton, superintendent of the Trethewey Mine) arrived about two weeks ago from Nova Scotia with a gang of men, by whose efforts a complete camp outfit and supplies were rushed through from Latchford to Silver Lake notwithstanding the congested condition of traffic on Montreal River route. Camps are now being built and preparations being made for an active winter's work.

The directors of the company are Alex. M. Hay (president of the Trethewey Mining Company), President; Robert E. Harris, K.C. (President of the Nova Scotia Steel & Coal Co.), Vice-President; J. Strachan Johnston, Solicitor, Toronto; Thomas Cantley (general manager of the Nova Scotia Steel & Coal Co.), New Glasgow, N.S., and Gilbert Stairs, of Halifax, N.S.

The company has purchased outright mining location T. R. 597, and has acquired under Working Bond mining locations T. R. 598, T. R. 35 and T. C. 54. The first three claims are known as the Gorman and Micmac claims, T. R. 35, discovered by the Indian Micmac, being the first discovery in the Silver Lake district T. C. 54 covers mining rights under Silver Lake, and lies between T. R. 597 and T. R. 598, which are situated at each end of the lake. T. R. 35 adjoins T. R. 597 to the south and the group of properties, which embrace about 150 acres, cover a range of about a mile and a half in length on what appears to be a very promising silver belt.

BRITISH COLUMBIA.

Rossland.

The fortnight that has just passed was one of heavy shipments for this district. The big copper furnace at the Trail Smelter was put into operation recently which necessitated the Consolidated Company making heavier shipments from the Centre Star Group at Rossland, while they are also shipping from the Snowshoe and Phoenix Amalgamated Group at Phoenix. The ore shipments from the Centre Star mines for the week ending Oct. 17th amounted to 5,070 tons, making 144,767 tons sent from this mine so far this year. The Le Roi is shipping about 1,500 tons of ore per week that will return the company approximately $12.50 per ton gross and which will leave them a neat profit after treatment charges have been deducted. It is understood that Mr. W. A. Carlyle will visit the Le Roi again in the impending future in connection with the plan of operation that he has laid out for the development of the mine.

The Le Roi 2, Limited, is shipping 500 tons per week of rich ore and are carrying on extensive development at different parts of their property.

Mr. A. B. W. Hodges, local manager of the Granby, and W. Y. Williams, consulting engineer, were in the camp one day last week inspecting the work now being carried on at the Giant-California. At the present moment considerable diamond drill exploration is being done.

While considerable development work was done on many of the smaller properties here during the past two weeks, some good ore being taken out in the course of the work, still none of the lessees shipped any ore to the smelter. There are several lots of ore about ready for shipment that will be sent away during the next few days.

The Le Roi 2, Limited, has just declared another dividend of two shillings per share. This last division of profits on the operation of the Josie and adjoining mines of the Le Roi 2, Limited, makes a total of six shillings per share paid by this company in dividends so far this year. The Le Roi 2, Limited, has not only paid dividends which amount to 18 per cent. on the present value of the stock this year, but they have been doing it for years past even though they operate on a smaller scale than other copper producers in the camp. The management is to be commended for this most satisfactory result.

Phoenix.

P. F. Roosa, provisional liquidator for the Dominion Copper Co., is seeking power from the court to borrow $20,000 on behalf of his company with which to pay the men to whom wages are still owing and settle other obligations. It is stated that the solvency of the concern is beyond question, the assets far exceeding the liabilities, but the company is badly in need of some ready money to settle accounts that are now due. It is figured that the mines of the Dominion Company are worth about $2,000,000. The National Trust Co. of Toronto is trustee for the bondholders. The new company is now being organized in the East, and is expected to take over the property of the old company in a couple of weeks, when operations will be resumed.

A property that has come to the front recently in Greenwood camp, in consequence of the increased activity, is the Johannesburg, where development work has been going on all summer. The ore body is easily traced 1,500 feet across the claim and averages 60 ft. in width. The ore assays 1½ per cent. copper, $8 in nickel and a small quantity of gold and silver. The ore could be placed in the bins of the B. C. Copper Co. smelter with a tramway half a mile long, which will no doubt be the method by which it will be handled as soon as shipments are begun. On the Colorado Group, Copper Mountain, an ore body has been opened up after much perseverance, and in the face of many discouragements that assays $9.10 gold and 18.97 per cent. copper.

J. Langeloth, of New York, president of the Granby Con. Mining, Smelting & Power Co., with J. C. Graves, of Spokane, general manager, and A. B. W. Hodges, local manager, inspected the Phoenix mines last week. The president was pleased with the way things looked around the mines. The smelter was also visited by the party and the important work now in progress there gone over.

The augmentation of one of the smelter furnaces has now been completed. This furnace is four feet longer and wider than the other seven, which will be enlarged in turn one at a time. The capacity of this furnace has been increased about 25 per cent. The building for the two big convertors on order is about ready for them. These convertors are large enough to handle the matte from all eight furnaces after being enlarged, when they are running full capacity. The ore shipments from the Granby are running from 21,000 to 22,000 tons per week. As the mines are closed down on Sunday lately this affects the shipments to some extent.

The Consolidated Company is producing about 2,500 tons per week from the Snowshoe, and small shipments are also being made from the War Eagle group, which, as the company already has a War Eagle group at Rossland, are known as the Phoenix Amalgamated group, for purpose of distinction. Development work is being pushed on both of the Phoenix groups, and in the course of work on the Phoenix Amalgamated they have opened up a 70 ft. ledge of copper ore of similar grade to that found in the Granby, which adjoins this property.

About thirty men are employed at the Oro Denoro, and approximately 700 tons of ore per week have been sent out during the past fortnight.

Work has been discontinued on the Little Bertha, North Fork. Considerable stock changed hands on the basis of work being resumed on this property, and there will be a few disappointed buyers if development is not continued and some tangible results obtained.

A 200-ft. tunnel is to be driven on the ledge at the Bell mine, Wallace Mountain.

The operators of the Sally mine, who have shipped 108 tons of valuable ore already this year, have a carload of rich ore about ready for shipment. Nine men are working at the mine.

The tunnel is in on the Woodburn 280 feet now, and some likely looking stringers and other indications are being exposed.

Work has been resumed on the Kingston at Hedley. This group consists of the Kingston, Metropolitan, War Horse and Grand View claims, which are nearer to Hedley than the rich

Nickle Plate properties. A strong 30-ft. vein exists on the Kingston, where most of the development has been done. This ledge carries chalcopyrite and pyrrhotite, and on the foot wall there is 8 to 10 ft. arsenical iron ore carrying gold. Assays range from $17 to $40. Most of the stock of this company is owned in Quebec. The property is regarded favorably, but much development work yet remains to be done. A force of eight men is now at work.

Nelson.

The leading feature of the mining situation here during the past week has been the heavy shipments of zinc made by the Whitewater mine. This company shipped 180 tons of zinc during the week, making a total of 6,375 tons for the year to date. Nearly all of this has been sent to Antwerp. The Whitewater properties now rank second in the shipping list for this section, the St. Eugene heading the table, and shipping over 900 tons of silver lead ore per week. The Silver Hustler, Rio, Maestro, and Black Diamond have lately joined the list of shippers, having sent out their initial shipments this year. Several more mills have started up as well.

The operators of the Aurora mine at Moyie have bought the boiler and compressor formerly used at the Dominion Copper Company's Brooklyn mine, Phoenix. There is a two foot ledge of clean shipping ore in the mine. As soon as the machinery is installed this ore will be taken out and shipments will be made across Moyie Lake as soon as the ice forms upon it.

Vancouver.

J. Cronin, formerly with the St. Eugene Co., has returned after a season's work on the property he has bonded in the Babine district. About 280 feet of development work in tunnels and shafts was done on the rich surface showing, the deepest shaft being 53 feet, but very little was determined as to how the ore will look at depth. In fact, the results were rather disappointing in some places. Another season's work will show the value of the group.

A find of ore assaying 287 oz. silver, 50 per cent. lead and $5 in copper has been made by H. Harris, of Rossland. The find is eight miles from Hazelton in the hills. It is the intention of the owners to ship from the property next year. There is a considerable quantity of ore in sight.

The Ingenica Mining Co. have taken an 8-ton plant into their mines over a rough road.

A large body of iron ore, similar to Swedish iron has been located on Douglas Channel.

Heavy snowstorms have driven the prospectors out of the Northern hills for this season. Most of the men have left their claims and have come out to the coast cities. Those who have taken up land have prepared for the winter and will remain in the valleys on their locations until spring.

An extensive deposit of bornite, carrying $50 to $60 in values, has been exposed in the Cornell mine.

R. C. Campbell-Johnson, of this place, has returned from a visit to the Queen Charlotte Islands, and says that these islands will excel as copper producers the famous Coeur d'Alene district of Idaho with its lead. Of course, that remains to be seen, but there is no doubt these islands are very rich and will undoubtedly revolutionize the mining industry of this coast.

GENERAL MINING NEWS.

NOVA SCOTIA.

Amherst, Nov. 3.—James Carson, a native of Halifax, died at Chignecto mines to-day. Carson was injured in attempting to prevent a box, which had become unbalanced, from running down the shoot. Carson was 27 years of age.

Stellarton.—The Allan shafts of the Acadia Coal Company are now well equipped. The new cages, when installed, will hold four boxes, and will permit of hoisting between 2,500 and 3,000 tons of coal per day. The present output is about 370 tons per day.

Cobalt.—On October 27th a train of 13 cars, loaded with medium and low grade silver ore, left Cobalt for Denver. The following mines contributed to this special shipment:

La Rose, 4 cars.
Kerr Lake, 2 cars.
Temiskaming and Hudson Bay, 2 cars.
O'Brien, 2 cars.
Temiskaming, 1 car.
Crown Reserve, 1 car.
Chambers-Ferland, 1 car.

This shipment is to be a speed trial. It is hoped that time will be saved by the mines joining hands in this way.

The Northern Customs smelter, formerly the Muggsley concentrator, has since July 15, treated over 4,000 tons from the Silver Queen dump, 1,000 tons from the Townsite, and over 1,500 from the City of Cobalt.

Sudbury.—Mr. R. Hedley has thirty men employed at the Leckie mine, Long Lake. Work will be carried on throughout the winter.

Major R. G. Edwards Leckie has left for Pedro Lake, north of Wahnapitae, prospecting for gold. W. Errington accompanies him.

Port Arthur.—There is talk of reopening the Foley mine, near Mine Centre, Rainy River district.

ALBERTA.

Lethbridge.—The new slope of the Royal Collieries is down 200 feet. The water system is completed, work on the tipple has been completed, and a large rooming house for the accommodation of the men is being erected.

BRITISH COLUMBIA.

Nelson, Oct. 31.—The total zinc ore shipments for the year from the Whitewater mines, near Sanden, amount to over 6,000 tons. All but 300 tons have gone to Oklahoma. The remainder has been shipped to Antwerp.

Rossland.—The Canada Zinc Company started work on October 15. Construction of the plant has taken two years.

Phoenix.—Towards the last of October the Phoenix Amalgamated, heretofore known as the War Eagle (not to be confused with the War Eagle of Rossland), became a shipper. It is the property of the Consolidated Mining and Smelting Company.

Victoria.—The steamer "Princess Ena" reached here on October 30 from Ladysmith. At Ladysmith she landed 1,000 tons of ore from the Japanese mines of the Awaya-Ikeda Company at Ikeda Bay. The Ikeda Company expect to ship 1,000 tons per month.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The annual report on the mines and quarries of the United Kingdom for 1907 gives the total value of the mineral output at £135,279,008, being an increase of £29,436,096, as compared with 1906. This is attributed to the increased production and higher price of coal. The total output of coal amounting to 267,830,962 tons, valued at £120,527,378, is the highest hitherto recorded, the figures for 1906 being 251,067,628 tons, valued at £91,529,266. Other leading items are iron ore, 15,731,604 tons, valued at £4,433,418; clay and shale, 14,827,895 tons, value £1,850,387; and limestone, 12,509,142 tons, value £1,323,624.

A large new coal-washing plant, designed for an ultimate capacity of 3,000 tons per 24 hours, has been built at Cardiff by the German firm of Meguin, for the Carbonifera Industriana Italiana of Genoa, Italy. The latter company have large briquett works in Italy, for which the Cardiff plant will supply material, the present power of production being 1,500 tons daily.

GERMANY.

Owing to the increasing price of wooden railway ties the management of the Prussian Government railways has decided to make an exhaustive series of tests as to the suitability of ferro-concrete ties.

The German Government has sent invitations to all petroleum-producing countries to take part in an international congress, which will probably be held at Karlsruhe, for the purpose of unifying the methods for testing and analyzing petroleum.

The use of the electric furnace for steel manufacture is increasing, especially in localities where mineral fuel is not available. Herr Georg Fischer has erected at Schaffhausen an electric steel works for the manufacture of steel castings by the Heroult process, in which castings up to one ton in weight can be produced.

AUSTRIA.

A number of anciently-worked gold mines in Bohemia and Moravia have been acquired by a company in Pribram, and will shortly be reopened.

AUSTRALASIA.

New South Wales is apparently destined to become an important shale-producing country. A wealthy British syndicate is making large expenditures in preparing for the development of enormous shale deposits in the Wolgan Valley, west of Sydney, and another with a nominal capital of £300,000 is being organized in Australia and England to develop the extensive shale-bearing district near Murrurundi, in the northern part of the State, where a lease of 3,000 acres has been secured.

The discovery of gold at a depth of 4,504 ft. in the Victoria Quartz mine, Bendigo, Victoria, is giving an impetus to deep sinking.

RUSSIA.

The South Russian coal market has been considerably affected by the decision of several southern railways to give up the use of coal and return to petroleum fuel, which they abandoned some years ago. The export trade is consequently likely to be increased.

NORWAY.

A concession to mine 36 iron ore claims at Fughestrand and Skravlaa in Hemnos Herred, Nordland, has been granted to Sixtus Sjoberg, of Stockholm, for 75 years. Very rigid conditions are laid down, including the payment of royalties, the satisfactory working of the properties, and the employment of Norwegians only, and it it stipulated that the concessionaire must not join any combination for "bulling" ore prices.

SOUTH AFRICA.

The average working cost per ton of sixty Rand companies for August was reduced to 17s. 4d., being 5d. less than for July. In January working costs stood at 19s. 7d. per ton, the saving effected in the meantime amounting to 10 per cent. This has been largely secured by substantial reductions in the pay of native laborers.

The South African Option Syndicate, Limited, is offering rewards up to £20,000 and an interest in the claim for the discovery of a diamond pipe in the Somabula diamond area of about 65 square miles in extent.

UGANDA.

A new gold field has been found in the territory west of Lake Albert, Nyanza, where gold has been discovered in Kakoi River gravel, and in the Adz Valley. The country is easily accessible.

UNITED STATES.

A new gold district has been discovered in New Mexico and named Sylvanite, from the character of the ore, which is a gold-silver telluride. Several rich properties have been opened up.

A stratum of sulphur 325 ft. in depth has been tapped in Liberty County, East Texas, which is believed to be the richest deposit known anywhere.

The Idaho Smelting and Refining Co.'s plant at Ponderay, Idaho, which has been reconstructed in the interests of the small mine owners of Idaho and Montana, has started operations.

A controlling interest in the Bullion-Beck mine, one of the oldest silver-lead mines in Utah, which has been operated since 1876, has been secured by the United States Smelting, Refining and Mining Company.

COMPANY NOTES.

THE HASTINGS (BRITISH COLUMBIA) EXPLORATION SYNDICATE, LIMITED.

Directors' Report.

The Directors have the pleasure to present the Tenth Annual Statement of Accounts and Balance Sheet for the year ended 31st May, 1908.

It will be seen that the financial position of the Company shows considerable improvement. The Cash on hand and at Bank amounts to £2,693 13s. 4d., being an increase of £1,009 19s. 4d., as compared with the corresponding period of 1907. The Administration Expenses for the year in London and British Columbia, which include Income Tax, Fire and Accident

Insurance and Government Ore Tax, exhibit a decrease of £87 6s. 7d., and there is a reduction of £1,274 11s. 3d. in the cost of Development Work.

The Ore shipped to the Smelters during the period under review netted £10,146 1s., that is after deductions for freight and treatment; the figures for the past four years being—

For the year ended	31st May, 1905	£10,099	16	10
" "	31st May, 1906	10,070	5	8
" "	31st May, 1907	9,574	9	1
" "	31st May, 1908	10,146	1	0

The accompanying advices from Mr. Leslie Hill, Local Representative and Consulting Engineer in British Columbia, will be read with niterest by Shareholders. The practice of publishing extracts from his Annual Report has been adopted by the Directors for several years and forms a continuous and descriptive history of the Company's mining operations. Mr. Hill writes:—

"Arlington Mine and Group.

"The development work done during the year at the Arlington Mine consisted of drifts 504 feet, crosscuts 25 feet, winzes 4 feet, and raises 430 feet. On the Micawber Claim the development work done was drifts 235 feet, raises 119 feet. There was also a raise of 46 feet put up on the ground of the Canadian King. The total development work amounted to 1,188 feet, and the cost of labor was $9,314.63, or $7.84 per foot.

"1,220 mine-cars of Ore and 7,110 mine-cars of waste were taken from the mine, and the stopes were filled with waste as far as practicable.

"Hauling by wagon commenced on 11th June, 1907, and ceased on 20th November, during which time 169 wagon loads of Ore were hauled to Erie and 26 car loads of Ore were shipped to the smelter at Trail, B.C. Sleighing commenced on 24th December and lasted up to March 11th, 1908, and 126 sleigh loads of Ore were hauled to Erie and 28 car loads of Ore shipped to Trail.

"In 1908 we commenced to haul by wagon on 25th May and 3 wagon loads of Ore were hauled to Erie during the month, the returns for which will appear in the accounts for 1908-1909.

"During the year 1,241.6 tons of Ore were shipped, which realized $53,143.20 net smelter returns, and $81.04 for Government Bounty on Lead Smelted, making a tital of $53,224.24, or $42.86 per ton.

"The cost of mining, sorting and shipping, including development work, was $27.06 per ton, made up as folls:—

Development (labor)	$7.51
Stoping	8.54
Sorting and Tramming	3.87
Assaying, Surveying, Surface and General Expenses	1.67
Supplies	2.25
Hauling to Erie and Loading on Cars	2.03
Insurance	.38
Ore Tax	.71
Miscellaneous Expenses, less Boarding House credit of $34.50	.10
	$27.06

"Total cost per ton of Ore, sorted and shipped, $27.06, leaving a gross Mine profit of $15.80 per ton, being 37.05 per cent. of the net Smelter Returns. This compares favorably with the results of the previous year's operations, as the Smelter Returns were $5.90 per ton higher and the expenses $1.49 lower, but the tonnage shipped was 167.38 tons less.

"Development.—The No. 7 North Drift was extended 259 feet, the No. 8 North Drift 97 feet, and the No. 9 North Drift 33 feet. A shoot of Ore was found on the No. 7 North Level, north of the Canadian King line and on the Directorate Claim. Some Ore was stoped from this shoot and there is still Ore in the raise. A raise has been put up from the No. 7 North Drift to a point south of the Canadian King line. This raise crosses the line of the Canadian King and connects with the old No. 4 Level which has been extended northerly. There appears to be a considerable shoot of Ore exposed by the raise, partly in the Company's ground and partly in Canadian King ground.

"A second and higher Adit was driven on the Micawber Claim a distance of 250 feet, and then raised to surface. At 50 feet up the raise we encountered a vein, and are now driving on this vein. It would seem that this should be the Arlington vein, but so far we have not found any pay Ore.

"East Kootenay Claims.

"No work has been done on these claims during the year. It is reported that a small vein of pay Ore has been found on a claim adjoining one of our claims and also joining a claim of the North Star Mining Company. Also it is stated that a large lead containing low grade Lead and Zinc Ore runs from the North Star workings diagonally across to the Mine of the Sullivan Mining and Smelting Co., and that this lead crosses some of your Claims. The value of the low grade Ore on this lead depends upon the Zinc situation—that is to say, whether Zinc Ore is to be admitted free into the United States, and also as to the success of some new methods of Zinc smelting which are about to be tried on a commercial scale in British Columbia."

Blairmore Coal Lands.

It is with much satisfaction the Directors announce that the final instalment on these important properties has now been paid to the Dominion Government of Canada, and the Patents for the lands have accordingly been applied for. This asset appears in the Company's books at £7.348 15s. 4d., an amount commensurately small with the estimate placed upon the property by experts who have visited the Coal Fields. There have been several local enquiries during the past twelve months by parties desirous of opening negotiations to purchase, but your Directors have not entertained any of the proposals submitted to them.

In April last your Directors had the advantage of a visit to this country by Mr. Leslie Hill, your Manager in British Columbia, and derived much benefit from the opportunity thus afforded for an interchange of views regarding local affairs of the Company, which it is gratifying to repeat, continue to be most carefully conducted under his able supervision.

It is with sincere regret that the Directors have to record the death of Sir Edward Birkbeck, Bart, who was identified with this Company from its inception, and the loss of his services is much to be deplored.

In conformity with Clause 66 of the Articles of Association, the Directors have elected the Hon. C. Melton Astley to fill the vacancy on the Board, and at the Meeting the Shareholders will be asked to confirm his appointment.

In accordance with Clause 69 of the Articles of Association, Mr. James Head retires by rotation from the Board, and, being eligible, offers for re-lection as a Director.

By Order of the Board,

E. HOLT,

Secretary

Registered Office of the Company,
163/4, Dashwood House,
New Broad Street,
London, E.C.
9th October, 1908.

The Hastings (British Columbia) Exploration Syndicate, Limited.

Balance Sheet, 31st May, 1908.

CAPITAL AND LIABILITIES.

	£ s. d.	£ s. d.
Capital Account—		
Nominal £100,000 0 0		
(100 Shares of £1 each.)		
Issued—		
60,375 Shares of £1 each, fully called up.....		60,375 0 0
Sundry Creditors in British Columbia		776 17 5
Carried forward		£61,151 17 5

ASSETS AND EXPENDITURES.

	£ s. d.	£ s. d.
Purchase Account		3,500 0 0
Property Account—		
Mining Claims at East and West Kootenay, as per last Balance Sheet		10,543 9 3
Blairmore Coal Lands (Expenditure in respect of Interest in), as per last Balance Sheet...	6,530 5 10	
Expended since	1,478 9 6	
	8,008 15 4	
Less—Amount of Deposit received on option to purchase	660 0 0	
		7,348 15 4
Plant, Machinery, Buildings, Live and Dead Stock at cost, as per last Balance Sheet....	9,730 6 9	
Less—Compressor sold	70 0 0	
		9,660 6 9
Canadian Publishing Company, 10 Shares of £2 each, fully paid		20 0 0
Cash at Bank—		
London (Current Account)..	213 6 8	
London in hand	7 14 1	
British Columbia (Deposit Account)	2,386 9 8	
British Columbia (Current Account)	85 5 0	
British Columbia in hand...	0 17 11	
		2,693 13 4
Expenditure—		
Balance brought forward from last Balance Sheet	23,104 2 1	
Expenditure from 1st June to 31st May, 1908—		
London Office Expenses..	350 0 0	
Audit Fee, 1907 (London)	31 10 0	
Petty Cash, Stationery, Cablegrams and Miscellaneous Expenses (London)	68 11 9	
Income Tax	55 0 0	
Insurance, Accident and Fire (British Columbia)	99 15 3	
Government Ore Tax (British Columbia)	91 10 9	
Salaries in British Columbia and Nelson Office Expenses	1,519 2 10	
General Expenses	149 3 11	
Carried forward	£25,464 16 7	£33,766 4 8

The Hastings (British Columbia) Exploration Syndicate, Limited.

Balance Sheet, 31st May, 1908.

CAPITAL AND LIABILITIES.

	£ s. d.
Brought forward 61,151 17 5	

Auditors' Report.

In accordance with Section 19 of the Companies Act, 1907, we report that we have audited the Balance Sheet of the Hastings (British Columbia) Exploration Syndicate, Limited, dated 31st May, 1908, as above set forth. We have obtained all the information and explanations we have required with reference thereto. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Company's affairs, according to the best of our information and the explanations given to us, and as shown by the Books of the Company.

TINGLE, COMBER & CO., Chartered Accountants.

110, Cannon Street, London, E.C.
2nd October, 1908.

ASSETS AND EXPENDITURE.

	£ s. d.	£ s. d.
Brought forward	25,464 16 7	33,766 4 8
Development Expenses—		
Arlington Group	5,746 8 5	
Fort Steele Claims	15 16 0	
Sunlight	1 7 0	
Canadian King	258 6 8	
	31,486 14 8	
Deduct—interest and Exchange £55 17 5		
Transfer Fees... 0 10 0		
	56 7 5	
	31,430 7 3	
Less Bullion Account, proceeds of Ore Shipped to Smelters. £10,639 8 11		
Deduct Expenses 493 7 11		
	10,146 1 9	
		21,284 6 3
Sundry Debtors, Government of British Columbia		63 16 6
Dividend of 1s. per Share on 60,375 Shares (March, 1902).	3,018 15 0	
Dividend of 1s. per Share on 60,375 Shares (March, 1905).	3,018 15 0	
		6,037 10 0
		£61,151 17 5

JAMES HEAD, Chairman.
G. L. WHATELY, Director.
E. HOLT, Secretary.

The Buffalo Mines, Limited, will more than double its dividend after the new year. Shareholders in the Buffalo now receive three per cent. quarterly, but this will be increased to five per cent. quarterly, making a regular annual dividend of twenty per cent. per annum. In addition a bonus of one per cent. per month will be paid, increasing the return to the shareholders to thirty-two per cent. per annum. The Buffalo has already paid almost a quarter of a million dollars on a capitalization of $1,000,000.

Directors of the Silver Queen have declared the third quarterly dividend of 2 per cent. payable December 1 to shareholders of record November 15. Comment was occasioned by the fact that this quarter the Queen is only paying three per cent., whereas in the two previous quarters it paid in addition a bonus of two per cent. a quarter. The Silver Queen management explain that the two bonuses referred to were paid for the purpose of bringing the dividend return on Queen up to 12 per cent. per annum for the past two years. Last year there was one dividend of 8 per cent., which, with the two bonuses this year, gives the holder 12 per cent. Three per cent. quarterly is being paid, and the management are not likely to increase it while silver remains so low.

The regular monthly meeting of the directors of the Granby scheduled for Nov. 4th in New York was postponed for one week.

An interim dividend of two shillings per share has been declared on Le Roi.

FOSTER COBALT MINING COMPANY.

The annual meeting of the Foster Cobalt Mining Company was held at McConkey's on the afternoon of November 4. The meeting was exceptionally free from acrimony.

The financial report submitted showed a cash balance on hand and in the bank of $17,342.18. There is a further sum of $24,185.42 due from ore sales.

The president's report, reprinted below, indicates that no high-grade silver ore is on hand for shipment. A parcel of thirtytons of ore high in cobalt is ready to send to the smelter. Ore on the dumps is valued at from $15,000 to $50,000. The dump stuff will be shipped to a custom concentrator during the winter.

Following is the report presented by the president at the meeting: In presenting the financial statement of the company for the year ending September 30, 1908, your directors do so with that natural regret which must be felt when any limited company does not report dividends paid upon its share capital. However, your board has the consciousness of having accomplished everything that was possible under the circumstances. The year's development has been extensive, though not productive of results in high silver values that reasonably had been looked for. During the year every economy has been practised and the operations have been conducted along most approved mining lines. During the past sixty days your Board has sought the advice of three eminent mining engineers who have examined the property. Their examinations having been made as a matter of courtesy and compliment to individual members of the Board, it is not possible to use their names in connection with their reports. However, they are men of such standing in their profession that your Board transmits to the shareholders the results of their examinations with the assurance that their reports may be relied upon. In brief, their conclusions are as follows:—

The main workings of the property (veins 5-1) have been carried to a depth of 225 feet. While the fissure vein continues strong, indicating possibly one of the strongest fissure veins in the district, no high values in silver have been encountered, and therefore it has been determined not to sink any lower in this shaft at this time. It is strongly recommended by all engineers hat our work of drifting out under Glen Lake be continued and prosecuted as rapidly as possible in order that the diabase contact believed to exist under the lake may be fully evplored. It would only be possible to make this drift from the 225-foot level, because of the depth of water in the lake and the fact that the top of the main shaft is at a considerable elevation above the lake.

The cross-cutting from vein No. 8 in the direction of veins 6 and 2 is also strongly endorsed, and since this cross-cutting has been undertaken one additional vein has been discovered which, while still running only in cobalt values, indicates the wisdom of this method of development. Only the actual work of drifting and cross-cutting can demonstrate the existence or non-existence of high values.

Your directors have aimed to make public every reasonable statement concerning the property, but are constantly confronted with the difficulty of making statements which might be too encouraging on the one hand or on the other hand would not do full justice to the possibilities of the property. It is just such a condition that confronts them to-day. There may be great possibilities as a result of the present outlet development. Eqaully true, this development may not be productive of any greater results than during the past months, therefore it but remains for your Board to pursue operations along lines clearly indicated by the best engineering advice available. That it will be done expeditiously and economically is the only warrant that the Board can give.

You will observe that since the last annual statement there have been no sales of treasury stock.

The present stock or ore on hand ready for shipment consists of about thirty tons of ore high in cobalt, but low in silver. The prospect for early shipment of high-grade ore is uncertain, depending entirely upon the results of the development indicated above.

The results of some concentration done on ores from the dumps confirm the belief that these dumps contain values variously estimated at from $15,000 to $50,000. During the coming winter months, when transportation is cheap, large quantities of this ore will be sent to the concentrator, where arrangements are in effect under terms distinctly favorable to the company.

Should the shareholders conclude to re-elect the present Board of Directors, a policy of rigid economy and some further reduction in cost of operation will be adopted.

The officers were re-elected as follows: John T. Kent, President; E. F. B. Johnston, Vice-President; Directors, Mayor J. Oliver, Simon Dyment, C. Jackson Booth, W. H. Fisher, and George H. Doran.

STATISTICS AND RETURNS.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending October 23rd was 19,287 tons; daily average, 3,214 tons. For the corresponding week of last year the output was 21,996, a daily average of 3,666 tons.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending October 31 was 18,835 tons, a daily average of 3,139 tons. For the corresponding week of last year the output was 21,172 tons, a daily average of 3,529 tons.

The output of the Crow's Nest Pass Company's collieries for the week ending November 6th was 19,634 tons, a daily average of 3,272 tons.

Nova Scotia Steel & Coal Company's output for October was 70,160 tons of coal, against 57,200 tons in September and 57,480

in October a year ago. The total for the year to date is 574,670 tons, against 528,720 tons in 1907. The pig iron output this October was 5,800 tons, and steel 7,750 tons. This is a record for both coal and steel.

The Dominion Coal Company's October shipments were 263,000 tons, compared with 339,573 tons in October, 1907. A large decrease was due to the boats' delay in getting up the St. Lawrence owing to the heavy fog and smoke prevailing. For ten months coal shipments were 1,257,370 tons, contrasted with 990,492 tons in 1907, an increase of 266,878 tons.

Dominion Coal's output was light for October, election day being practically a holiday at the mines. Up to date, however, the output is approximately 203,000 tons ahead of a year ago. The output in tons follows:—

	1908.	1907.
January	314,108	252,248
February	285,649	225,988
March	346,529	212,831
April	298,745	316,384
May	332,588	237,269
June	347,000	319,000
July	368,000	321,000
August	310,000	316,302
September	263,000	296,889
October	264,959	339,573
Totals	3,130,578	2,927,484

The output of the Dominion Iron & Steel Company for the month of October is as follows: Pig iron, 21,000 tons; steel ingots, 22,500 tons; shipments, 18,000 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp for the week ending October 24th:—

	Ore in lbs.
*Coniagas	64,498
Cobalt Lake	62,940
Crown Reserve	126,000
Chambers-Ferland	140,000
Drummond	125,000
La Rose	335,000
McKinley-Darragh	57,000
Nipissing	189,380
O'Brien	192,140
Silver Leaf	114,870
Temiskaming & Hudson Bay	60,000
*Trethewey	132,000

*Partly concentrates.

The total shipments for the week were 1,600,128 pounds, or 800 tons. Total shipments from January 1 to date, 35,340,743 pounds, or 17,670 tons.

Cobalt ore shipments were heavy for the week ending October 31st, due no doubt to exhibition trainload sent to the Denver smelter. Thirteen mines shipped 1,706,690 pounds, or 853 tons of ore. The shipments from the camp for January 1 to date were 36,589,559 pounds, or 18,294 tons.

Shipments for the week and year were, in pounds:—

	Week.	Since Jan. 1.
Buffalo	.....	912,950
*Coniagas	.....	1,032,853
Cobalt Lake	.....	404,623
Crown Reserve	127,000	594,688
*Cobalt Central	43,000	487,075
Chambers-Ferland	60,440	383,890
City of Cobalt	42,000	1,239,300
Drummond	100,000	1,291,520
Foster	.....	297,300
Kerr Lake	184,050	1,091,394
King Edward	.....	127,240
La Rose	386,330	7,331,970
McKinley-Darragh	.....	2,54,770
Nipissing	187,260	2,941,610
Nova Scotia	55,400	447,675
Little Nipissing	.....	40,110
Nancy Helen	.....	367,427
O'Brien	190,370	5,846,157
Peterson Lake	.....	41,237
Right of Way	81,840	1,238,620
Provincial	.....	143,210
Silver Leaf	.....	372,900
Silver Cliff	.....	52,000
Silver Queen	.....	1,555,990
Townsite	.....	251,700
Temiskaming	63,000	931,620
Temiskaming & Hudson Bay	185,160	2,073,666
*Trethewey	.....	2,042,476
Watts	.....	561,680

*Partly concentrates.

Cobalt ore shipments for the month of October fall below those of September and August, but lead every other month in the year. The La Rose was far away ahead of the other mines, with total shipments for the month of 1,$92,120 pounds, against 822.040 pounds for the Nipissing, 665.160 for the T. & H. B., 673,770 for the O'Brien, and lesser amounts for the others.

Some well-known mines do not appear in the list at all. Shipments from the camp by months, in tons, were:—

Month.	1907.	1908.	Inc.
January	980	1,325	345
February	903	1,174	270
March	1,027	1,832	805
April	533	1,317	784
May	1,158	1,601	443
June	1,939	1,581	*358
July	1,327	2,022	695
August	1,139	2,366	1,227
September	760	3,322	2,562
October	1,292	2,325	1,033
Total	11,058	18,864	8,806

*Decrease.

B. C. ORE SHIPMENTS.

Nelson, B.C., October 24.—The following are the detailed shipments from the various mines and the receipts of the smelters of the districts of Southeastern British Columbia for the past week and year to date:—

BOUNDARY ORE SHIPMENTS.

Mine.	Week.	Year.
Granby	21,840	842,684
Mother Lode	9,074	198,810
Oro Denoro	680	51,686
Snowshoe	2,492	16,831
Phoenix Aamalgamated	120	205
Other mines	....	22,248
Total	34,206	1,132,464

ROSSLAND.

Centre Star	4,007	139,003
Le Roi	917	63,400
Le Roi No. 2	479	24,02.
Other mines	....	982
Total	5,403	227,414

SMELTER RECEIPTS.

Grand Forks	21,840	842,684
Greenwood	9,754	253,036
Boundary Falls	....	21,872
Trail	8,025	254,990
Northport	1,179	69,468
Marysville	....	5,730
Total	40,798	1,447,780

The following are the ore shipments for the week ending Oceober 31st, and year to date:—

BOUNDARY SHIPMENTS.

Granby	22,493	865,177
Mother Lode	7,958	206,768
Oro Denoro	650	52,336
Snowshoe	2,691	19,522
Phoenix Amalgamated	25	230
Other mines	....	22,248
Total	33,817	1,166,281

ROSSLAND SHIPMENTS.

Total	6,255	234,989

SLOCAN-KOOTENAY SHIPMENTS.

St. Eugene	942	21,243
Whitewater	75	1,570
Whitewater, zinc	180	6,375
Whitewater, milled	280	13,180
Poorman, milled	250	9,300
Queen, milled	400	8,500
North Star	124	3,488
Arlington, Erie	47	2,239
Second Relief, milled	145	2,200
Richmond	97	2,025
Blue Bell	17	1,260
Standard	21	1,123
Rambler-Cariboo	19	1,006
Silver Cup	57	799
Reco	36	371
Westmont	256	347
Kootenay Belle, milled	25	275
Slocan Sovereign	7	70
Nugget, milled	35	70
Alpha	13	29
Silver Hustler	20	20
Other mines	....	12,441
Total	3,046	87,931

EAST OF COLUMBIA RIVER.

Total	2,025	80,636

The total shipments for the week were 42,118 tons, and for the year to date 1,489,201 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C., Oct. 31st.

Total	22,493	965,177

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	8,608	261,644

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	8,936	263,836

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Total	2,173	71,641

The total receipts for the past week were 42,210 tons, and for the year to date 1,489,900 tons.

MARKET REPORTS.

Connellsville coke, f.o.b., ovens:—

Furnace coke, prompt, $1.60 to $1.70.
Foundry coke, prompt, $2.00.

Metals.

Tin, Straits, 31.10 cents.
Copper, prime Lake, 14.625 cents.
Lake arsenical brands, 14.625 cents.
Electrolytic copper, 14.50 cents.
Copper wire, 15.50 cents.
Lead, 4.45 cents.
Spelter, 5.05 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 25 cents.
Nickel, 40 to 47 cents.
Platinum, $19.50 to $20.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $47 per 75 lb. flask.

Silver Prices.

	New York. cents.	London. pence.
October 24	51 3-8	23 11-16
" 26	51 3-8	23 11-16
" 27	51 1-4	23 5-8
" 28	51 1-4	23 5-8
" 29	50 7-8	23 7-16
" 30	50	23 1-16
" 31	50 3-8	23 1-4
November 2	50	23 1-16
" 3	..	23
" 4	49 5-8	22 15-16
" 5	49 5-8	22 15-16
" 6	50 1-8	23 1-8
" 7	50	23 1-8
" 9	49 5-8	22 15-16

The Canadian Bank of Commerce

HEAD OFFICE, TORONTO
Established 1867

B. E. WALKER, President. A. LAIRD, Gen. Mgr.
A. H. IRELAND, Superintendent of Branches.

Paid-up Capital, -	**$ 10,000,000**
Rest, - - -	**5,000,000**
Total Assets, - -	**113,000,000**

Branches throughout Canada and in the United States and England, including the following:

Cobalt	Nelson	Seattle
Cranbrook	New Glasgow	Skagway
Dawson	Ottawa	Springhill
Fernie	Parry Sound	Sydney
Greenwood	Penticton	Toronto
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Copper and Lead Mine

on Lake Superior, near Port Arthur, four hundred acres; old title; considerable development done; good mineral showings; bargain price; easy terms on working option. For further particulars, apply to

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Amatite ROOFING



PAINTING a roof is work. Buying the paint is expense. Both are needless if your roof is Amatite.

When you finish laying Amatite, take away your ladder, pick up your hammer and knife, go away and leave the roof to take care of itself. A few years later you may go back and look at it if you care to, but it won't be necessary. and there won't be anything to do.

This is due to the fact that Amatite has a *real mineral surface*—a surface that is too strong to need protection—too durable to require painting.

If you buy one of the smooth surfaced roofings you will have to paint it every two or three years to keep it from leaking. In fact, such roofs depend on the paint almost entirely for their waterproofing qualities.

Amatite on the other hand depends for its waterproofing upon double layers of Coal Tar Pitch,—the greatest known enemy to water.

Amatite comes in rolls of 110 square feet ready to lay. No special tools are required, and anyone can lay it properly.

A Sample of Amatite will be forwarded free on request. Send for it and see how much better it is than the kind which requires painting to keep tight.

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Chemical and Physical tests of all Materials.

Mining properties examined and reported upon.

Write for prices for Ore analysis.

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Some Books of interest on Mining to be had from the Book Department of the Canadian Mining Journal, Toronto, Ont.

The Copper Mines of Lake Superior. By T. A. Rickard. An attractive volume of 165 pages, handsomely illustrated. The present work consists of a group of interesting articles in a revised and amplified form, which were originally published in the columns of The Engineering and Mining Journal during the latter part of 1904. Octavo, cloth. Price, $1.00.

The Chemistry of Cyanide Solutions Resulting from the Treatment of Ores. By J. C. Clennell. Price, 2.50.

Across the San Juan Mountains. By T. A. Rickard. A graphic description of a picturesque ride of 400 miles on horseback through the San Juan Mountains in South-western Colorado. The work is written in vigorous and buoyant style, and the information contained therein, while appealing specifically to the geologist, prospector, and mining engineer, will also prove of great interest and enjoyment to the general reader. Small quarto, cloth, ornamental covers and profusely illustrated. Price, $1.00.

Ore Deposits. A discussion republished from the Engineering and Mining Journal, containing the recent contributions on the origin of ores. By S. F. Emmons, W. H. Weed, F. L. Ransome, C. R. Van Hise, T. A. Rickard, and C. W. Purington. The matter originally published has been revised and amplified. A review of the subject by the Editor of the Engineering and Mining Journal is added. It is an up-to-date discussion of a subject which is of great interest to mining men. The book contains 100 pages. Cloth. $1.00.

Mineral Resources of Canada. An illustrated handbook giving a brief outline of the economic minerals of Canada, and sketching the mineral resources of each province. The book contains 140 pages, 32 color engravings of the most important minerals. The latest mineral Resource Map of the Dominion, showing the chief mineral deposits, is also included. No such work has been attempted in Canada before. This volume should be in the hands of every one interested in the mining industry. The price of this volume is extremely moderate. $1.00.

Minerals and How They Occur. By Willet G. Miller, Provincial Geologist, a volume of 250 pages, illustrated. This book is especially adapted to the prospector for minerals, as he must have a knowledge of mineralogy before he can properly understand the character of rocks and the effects which are produced on them by atmospheric and other agencies. If you are a prospector this is the work for you. Price, $1.00.

The Sampling and Estimation of Ore in a Mine. By T. A. Rickard. Sampling and mine valuation are eminently practical subjects, and in this work they are handled in detail by engineers and experts of the first rank, who have had world-wide evperience in these matters. To students, mine directors, mining engineers, mine investors, and engineers generally, this volume will be found extremely useful. Octavo cloth, profusely illustrated. Price, $2.00.

Rocks and Rock Minerals. By L. V. Pirsson, Professor of Geology in Yale University, 414 pages, 74 figures, 36 full-page half-tone plates. Not all mining men have an intimate knowledge of petrology, or the science of rocks. Even those who have had the advantage of a college course find that only a small residue of what they learned adheres to them. Most text-books on the subjects are cast into forms that repel the lay reader. Hence it is not easy for the beginner to acquire the rudiments of the science. "Rocks and Rock Minerals" is an attempt to present the outlines of petrology in such a way as to give an intelligent idea of the subject to readers quite unacquainted with the microscopic standpoint. Rocks and rock minerals are dealt with entirely from a megascopic, or practical outdoors, point of view. The book before us attains the desired object of giving the reader a knowledge of rocks and rock minerals without recourse to the microscope. It is a very fair introduction to the study of geology generally. Part III., in which igneous, stratified, and metamorphic rocks are described, is an excellent treatise in itself. Simplicity is the keynote of the book. Cloth. Price, $2.50 net.

A History of Cobalt. During the summer of 1907 the Canadian Mining Journal published a beautiful illustrated souvenir volume. Included in this volume is a history of the early days of Cobalt. An excellent map of the district accompanies the book. Price, $1.00.

The Electric Furnace. By Alfred Stansfield, D.Sc., A.R.S.M., Professor of Metallurgy, McGill University. There has long been need of a good book on electric furnaces. The increased importance of the subject and the great value to metallurgy makes this book most timely. 211 pages (illustrated) 6 x 9 inches. Price, $2.00.

Simple Mine Accounting. By David Wallace. A neat compact description of the simple methods of keeping mine accounts. Mr. Wallace is an expert mine accountant and in this book he outlines briefly and simply the kind of accounts and records which a small mine should keep. 64 pages 6 x 9 inches, with bookkeeping forms. Price, $1.00.

PROFESSIONAL DIRECTORY.

The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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Dominion of Canada

Ontario

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Haultain, H. E. T.
Hassan, A. A.
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Tyrrell, J. B.
Willmott, A. B.

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Cirkle, Fritz
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LeRoy, O. E.
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Mining Engineer,
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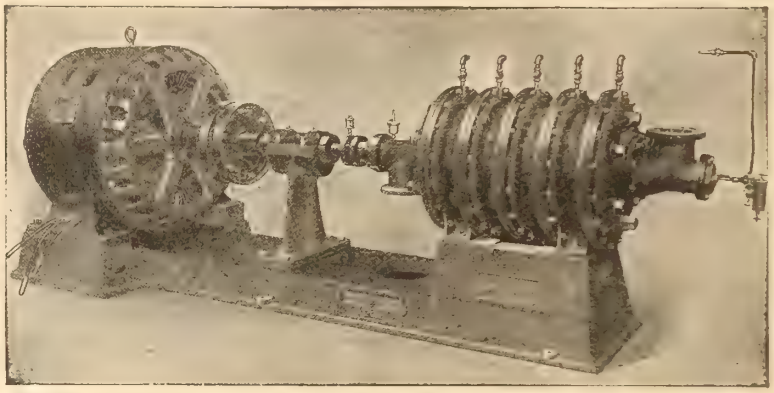
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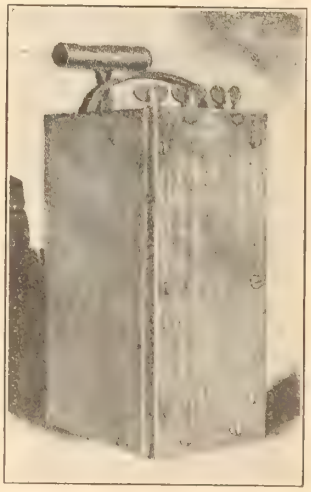
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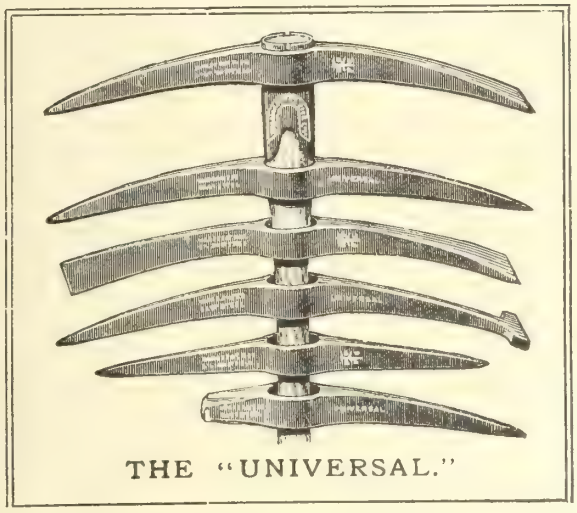
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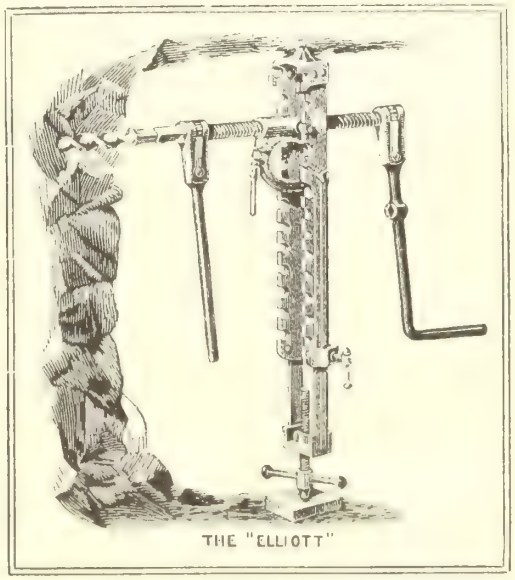
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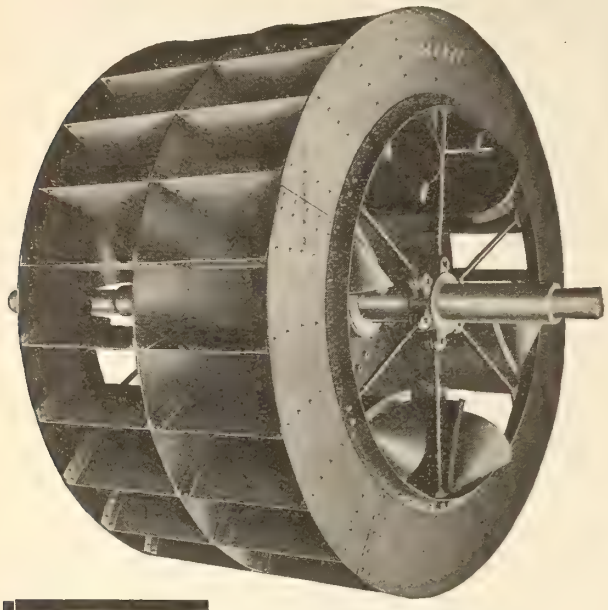


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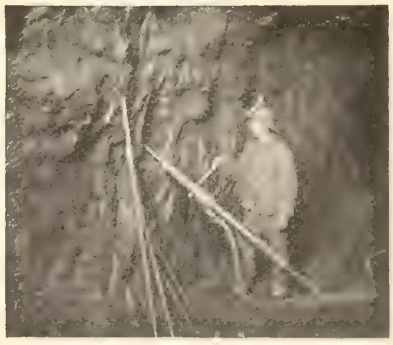
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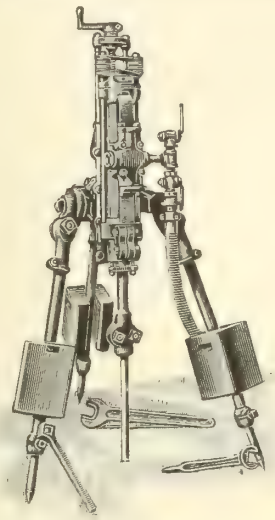
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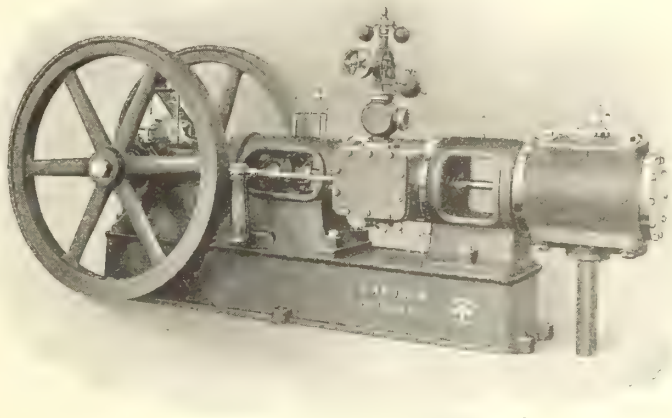
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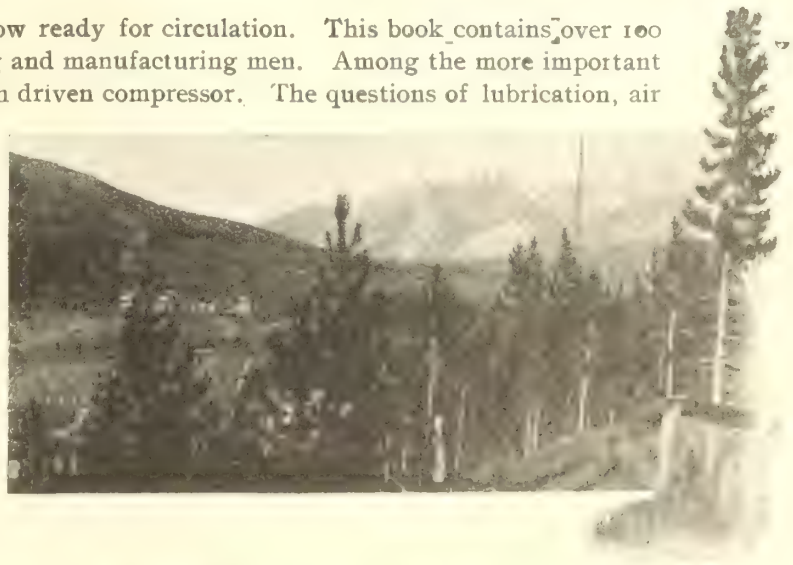
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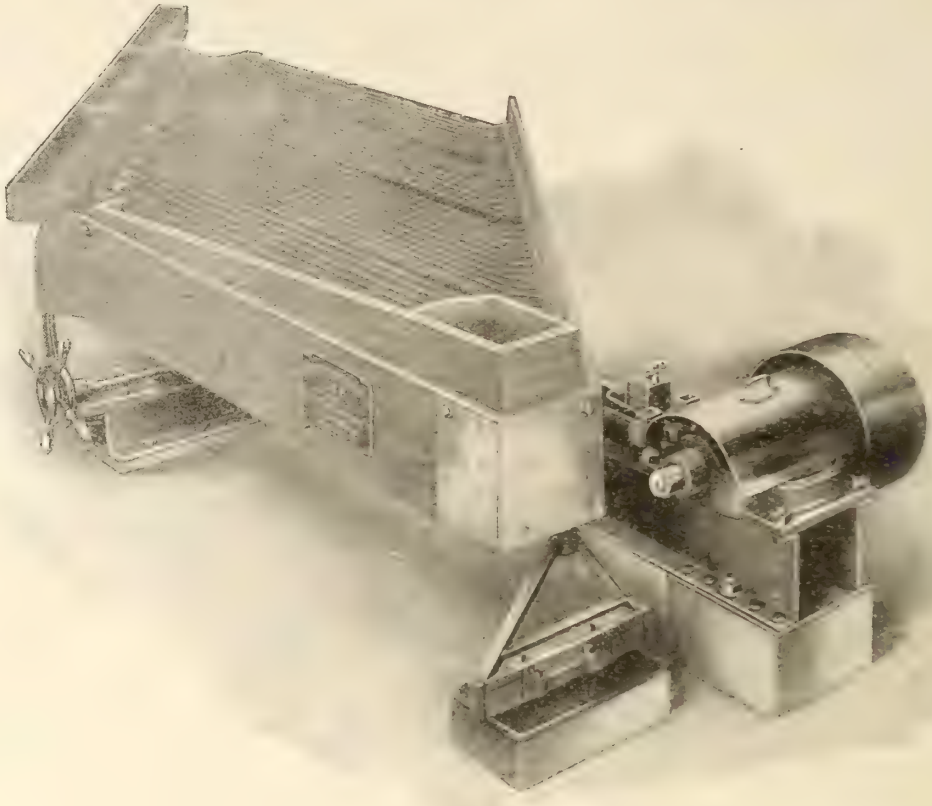
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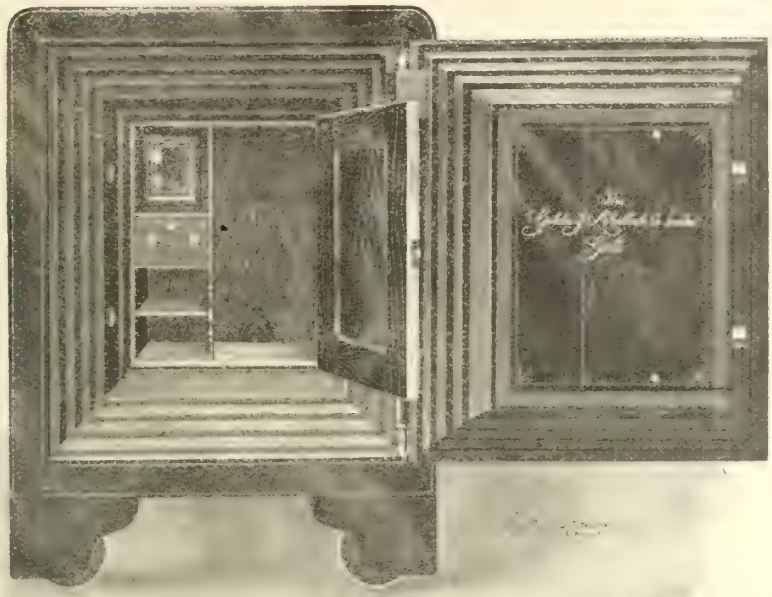


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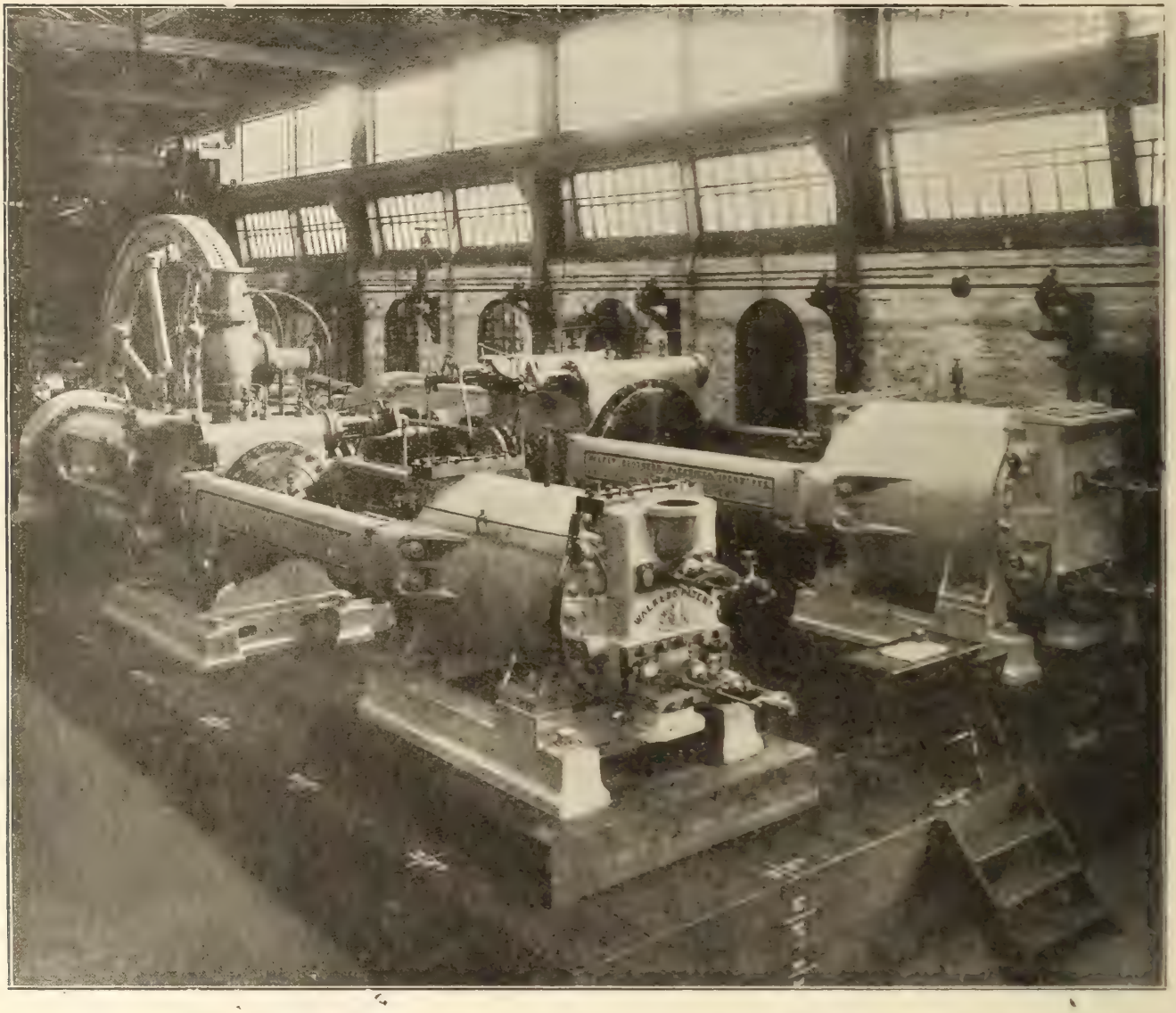
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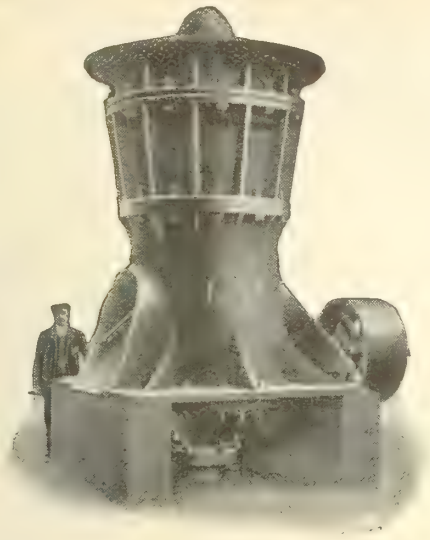
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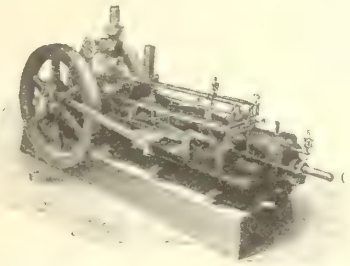
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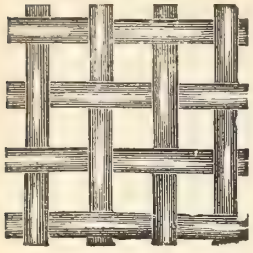
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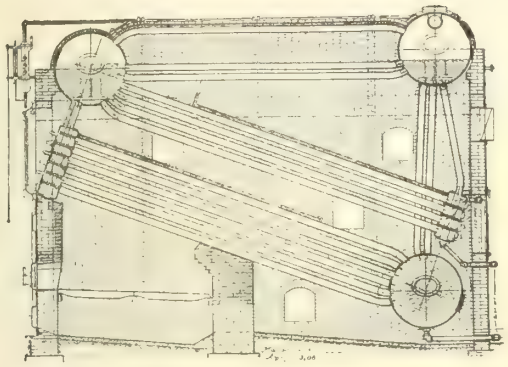
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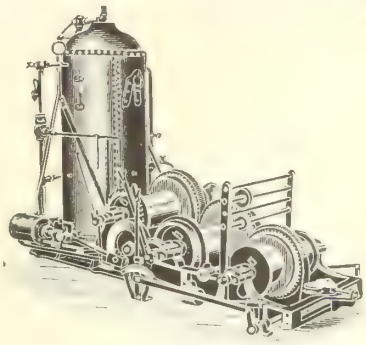
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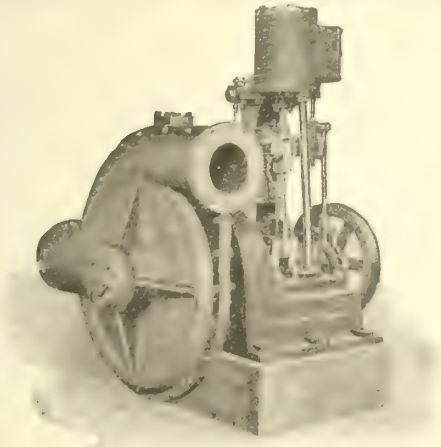
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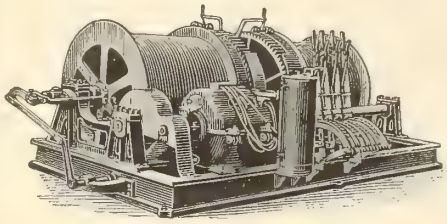
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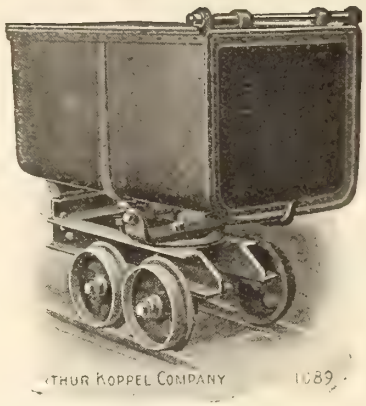
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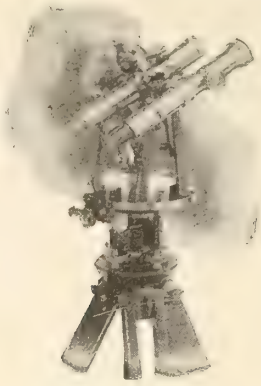
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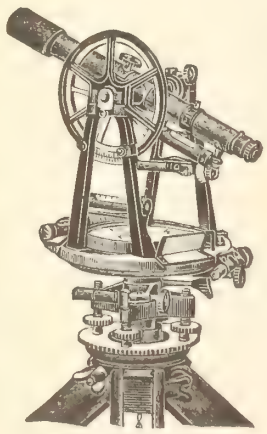
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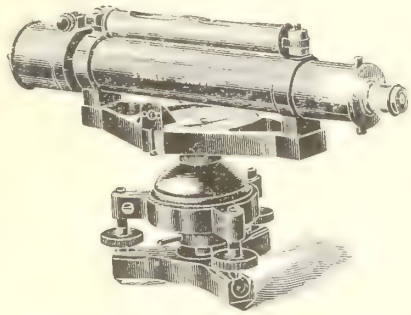
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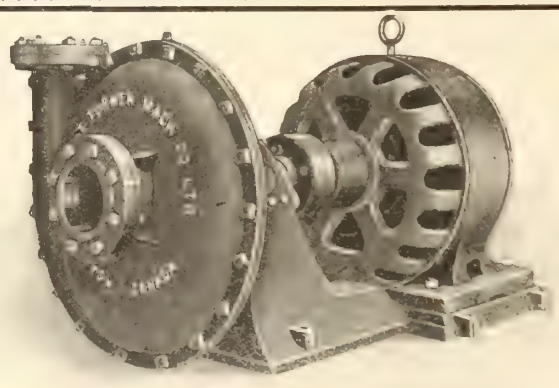
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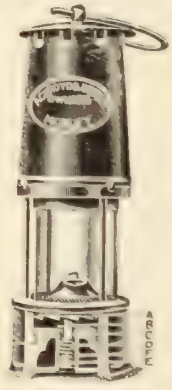
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THE CANADIAN MINING JOURNAL

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

"Entered as second-class matter April 23rd, 1908, at the post-office at Buffalo, N.Y., under the Act of Congress of March 3, 1879."

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MORE ABOUT THE BOOM.

The purchase of shares in recent Cobalt and Montreal River flotations is being indulged in to an extraordinary extent by men of all classes. For their guidance they rely upon brokers and promoters who, in most cases, give nothing for what they receive. In other words, thousands of misguided people are voluntarily handing out their cash to men who not only are totally incompetent to advise, but are ever most anxious to obscure the truth. In short, the eager dupes of newspaper puffs and prospectuses are providing motor-cars, residences, and dropsical bank-accounts for purveyors of engraved paper.

The net results of the present boom can be summed up thus: Some thousands of Canadians will have learned that mines are not made in printing-offices; some dozens of men who should be decorating the interior of our institutions of correction will have acquired wealth; and not a few newspapers, more particularly the Toronto World, will have enjoyed an abnormal revenue from advertising. All of which will react most detrimentally upon genuine mining and honest mining men.

The one outstanding consideration that demands our attention at present is the fact that the promoters of newspaper-advertising schemes have been able to use the names of men who pose as mining experts, but who are known to be ready and willing to sell their approval for a price. To illustrate this it is merely necessary to say that not one of the scores of wild-cats has ventured to employ a mining engineer of good standing. In the nature of things the flowery prospectus and the competent mining engineer cannot mix. And even when a respectable mining engineer has reported favorably on a prospect professional etiquette ensures his silence, and the public is none the wiser.

On the other hand, it is absurdly easy to buy, in open market, the favorable reports of any number of pseudo-experts. And, to lend dignity to the impossible effusions of these prostitutes, it is only necessary to attach the name of a few complaisant and respectable citizens to the list of directors.

Briefly, the gambling that is being carried on in Toronto and Montreal under the name of "mining" can claim no closer kinship to that industry than can Monte Carlo to the Heavenly City. The stock-in-trade for the most profitable confidence-game that modern ingenuity has devised consists in a few acres of land conveniently distant, a striking name, an alleged mining expert, an advertisement in the dailies, a few guinea-pig directors—and there you are!

That such things can and do exist in a community of sane men and women is almost beyond belief. Not

all the blame can be thrown upon those newspapers that have aided and abetted the fakirs. Nor yet upon the Provincial Government can all the responsibility be placed. There rests upon honest mining engineers, mine owners, and upon all connected with what should be the noblest and cleanest of industries, the obligation to give public utterance to their convictions. Further, the Canadian Mining Institute is called upon to throw its influence on the side of right.

But most particularly is it desirable that from our mining schools, from the men who are training the mining engineers of to-morrow, the public should receive a clear pronouncement. The profession of mining engineering requires and must demand protection from pretenders.

WAVERLEY FORTY YEARS AGO.

That indefatigable worker and versatile scientist, Dr. Henry Youle Hind, contributed largely to the literature of this country. His volumes of travel will, perhaps, keep his name green when his other labors shall have been forgotten. But to many his reports on Nova Scotian mining districts are fraught with special interest.

Dr. Hind's report on the Waverley Gold District of Nova Scotia is dated 1869. At that time, except for the use of steam, mining methods in Nova Scotia were crude and primitive. Dr. Hind remarks that on the North or Brodie, lead at Waverley there were then 23 shafts within a distance of only 1,800 feet. The average distance between the shafts was 78 feet; the greatest depth attained was 240 feet; and the mean depth 185 feet. This was also true of the Tudor, North Taylor, South Taylor, and Number VI. leads, on which over a total superficial distance of 4,800 feet, there were no less than 55 shafts. Dr. Hind not only pointed out the futility and wastefulness of a system whereby one shaft was sunk "to every superficial area of forty-seven feet square," but strongly of advised consolidation and co-operation.

He condemned also the practice of mixing quartz from different leads and crushing the whole together. "A poor lead worked at the same cost as a rich lead may neutralize all the benefits which would be obtained if the rich lead were worked alone. Each lead ought to be crushed by itself, and a statement of the result with the cost of mining the quartz recorded. . . . Plans of all the workings are also essential, showing at least monthly progress."

In those days several of the Waverley mines showed, as they do to-day, rich specimen ore. The companies that encountered sufficient quantities began to pay large dividends. Against this Dr. Hind wrote unreservedly. His advice is as necessary to-day as it was forty years ago. "The absorption of all returns to pay large dividends is as a rule as fatal an error in gold mining as in most other enterprises."

The mining costs per ton were extravagant. Dr. Hind states that as Mr. Burkner, operating on the Tudor lead, reported mining expenses of $12 per ton up to the close of 1866. A reduction to $8 per ton was then effected. But at least 33 per cent. of the gold was lost in the tailings.

At one place ten men were employed breaking and feeding 35 tons of quartz to the mill, during 24 hours. "Why should not this work be done by four men feeding a "breaker" with hopper, and moved by the surplus water power?" is the pertinent enquiry of Dr. Hind.

Mr. Burkner's sworn returns for the year 1865 to the Commissioner of Mines show a yield of 8,727 oz. 11 dwt. from 6,972 tons of ore, an average of 1 oz. 6 dwt. per ton. The total working expenses were from $10 to $14 per ton. But the miners levied on the mine, in misappropriating specimens and amalgam, to the surprising extent of "at least $50,000 to $60,000, or 2,500 to 3,000 ounces, if not more!"

There are innumerable passages that, if space permitted, we would quote from Dr. Hind's engaging pamphlet. We have indicated enough, however, to show that there were many factors militating against the continued growth and success of this rich Nova Scotian gold district. Obviously, no gold mines could long survive such treatment as that to which the Waverley mines were subjected.

The mistakes and blunders of the early gold-seekers without doubt have been repeated indefinitely in succeeding years. Probably in the smaller mines and prospects of the province they are being repeated to-day.

As a wonderfully interesting piece of history, and as a clear warning against the errors of ignorant haste and inefficiency, Dr. Hind's "Report on the Waverley Gold District" should be reprinted and distributed throughout the mining sections. At present, copies of the report are becoming more and more rare.

DISCUSSION.

In glancing through the last annual volume of the Journal of the Canadian Mining Institute, a volume, by the way, that outshines those of previous years, we notice a sad dearth of discussion. In themselves the papers are of conspicuous value. Subjects such as the smelting of Cobalt ores, the duties of mining engineers, assaying practice, are of immediate importance. But in every paper there are points that call for discussion. Intelligent, fair discussion is always illuminating. Often it is essential.

Matters of this sort rest primarily with the members of the Institute. First of all, it behooves those who intend to contribute papers to send in their manuscript early in the new year, so that the Secretary may have ample time to get them through the press. Sec-

ondly, those of the members who are able to attend the annual meeting in March should come prepared to exchange views on one or more topics.

The tendency at meetings of technical societies is to forego the reading of papers in their entirety. Usually the author reads a synopsis, and printed copies giving the full text of his paper are distributed. This is a practice that should and must be followed. Time is an all important factor in conventions of busy men. Moreover, listening to a long dissertation that can be perused much more rapidly from the printed page is a weariness to the flesh. It deadens the hearers and leaves little time for debate.

If at all possible—and it will only be possible with the prompt assistance of all intending contributors—each and every paper should be in the Secretary's hands not later than the last of January next.

We may hope then to have advance copies long enough before the annual meeting to ensure complete, lively, and edifying discussions. These, we are sure, will constitute by no means the least instructive portions of the Institute's Journal for 1909.

THE GREAT NORTHERN COAL COMPANY.

The modest province of Nova Scotia has now been included in the wild-cat belt. Under the nurturing care of Dr. Hugo Von Hagen, a lusty member of the species has sprung into life. Its ostensible home is Cumberland County. Its real habitation is in the cultivated cerebellum of the virtuous Von Hagen.

"Roach's Financial Facts," one of those generous guides to wealth and welfare, is published in New York. Its issue of August 15, 1908, is before us. Mr. Henry N. Roach is, apparently, editor and proprietor. Mr. Henry N. Roach is also sole fiscal agent for the "Great Northern Coal Company," and he takes a full page in which to tell of his faith in Von Hagen, and his love of mankind generally. But not one little fact does he impart about the property of the "Great Northern Coal Company." Facts, however, are not necessary. They are in bad taste.

How many shekels would accrue to the exotic Von Hagen and to the revering Roach (was ever man better named!) if they dealt in facts!

Quite between ourselves, Von Hagen's coal mines will never earn a dividend. Nevertheless, such is the skill of this transplanted gentleman, a regular dividend of one per cent. per month is announced in this same issue of "Roach's Financial Facts." And, once more between ourselves, the illustrious Von Hagen deserves so well of his shareholders that he should immediately and for the rest of his natural life be provided with board and lodging at the expense of a grateful nation. There are substantial residences at Dorchester, N.B., and at Kingston, Ont., wherein fitting accommodation is ready. The dear Doctor's modesty should not be permitted to interfere. Indeed he and his only less deserving associates should be given no chance to discuss the matter.

CANADIAN BANKING.

The communications received since our reference to the inadequacy of reserve against Canadian bank notes indicate much misconception on the part of the public concerning these matters.

Subsection 6, Section 65, of the Canadian Bank Act, which deals with the payment of notes of a defunct bank, is as follows:—

"Nothing herein contained shall be construed to impose any liability upon the Government of Canada, or upon the Minister, beyond the amount available from time to time out of the Circulation Fund.

Subsections 3 and 5 of Section 64 states that the Circulation Fund shall be made up by each chartered bank keeping an amount deposited with the Government of Canada equal to 5 per cent. of the average circulation of its noes. (The Act does not specify whether this sum is to be kept in gold, Dominion notes, or ordinary securities.) And, further, that this circulation fund shall continue to be held for the "sole purpose" of redeeming the outstanding notes of any suspended bank.

Subsection 9 of Section 64 reads as follows:—

"The Minister shall, with respect to all notes paid out of the circulation fund, have the same rights as any other holder of the notes of the bank: Provided, that all notes, and all interest thereon, so paid by the Minister, after the amount at the credit of such bank in the Circulation Fund, and all interest due or accruing due thereon, has been exhausted, shall bear interest at a rate of three per centum per annum, from the time such notes and interest are paid until such notes and interest are repaid to the Minister by or out of the assets of such bank."

Thus the Canadian Government takes no responsibility beyond acting as the custodian of this small Circulation Fund. Moreover, this fund, outside of the amount contributed by the defunct bank itself, is in reality nothing more than a source from which a small temporary loan may be had to meet the outstanding notes of the defunct bank. This loan is a first charge on the assets of the bank until it is paid back to the Minister.

To show how inadequate this fund is in amount, it is only necessary to quote the following figures from the last monthly Bank Statement, viz., that for October, 1908:—

Name of Bank.	Notes in circulation.	Deposits with Dom. Gov. for security of note circulation.
Bank of Montreal	$12,417,132	$600,000
Bank of New Brunswick	719,125	35,000
Quebec Bank	1,990 543	87,360
Bank of Nova Scotia	2,972,074	150,110
St. Stephen's Bank	184,790	13,000
Bank of B. N. A.	3,492,547	682,775
Bank of Toronto	3,869,839	160,000
Molsons Bank	3,122,883	145,000
Eastern Townships Bank	2,733,210	123,000
Union Bank of Halifax	1,462,897	75,000
Banque Nationale	2,105,127	90,000
Merchants Bank	4,915,628	240,000
Banque Provincial	1,130,743	45,519
Union Bank of Canada	3,263,293	150,000
Can. Bank of Commerce	9,336,545	450,000
Royal Bank of Canada	3,724,922	190,000
Dominion Bank	3,709,465	160,000
Bank of Hamilton	2,314,447	125,000
Standard Bank	1,423,692	61,000
Banque de St. Jean	14,239	11,427
Banque d'Hochelaga	2,350,906	102,996
Banque de St. Hyacinthe	43,565	16,995
Bank of Ottawa	2,895,895	150,000
Imperial Bank	3,776,027	192,458
Western Bank	504,150	27,005
Traders Bank	2,882,945	148,270
Sovereign Bank	124,420	123,569
Metropolitan Bank	1,124,116	47,200
Home Bank	968,340	35,000
Northern Crown Bank	2,107,790	76,000
Stirling Bank	781,768	33,718
United Empire Bank	177,695	12,000
Farmers' Bank	396,005	15,000
	$83,036,762	$4,574,402

SOUTHEASTERN BRITISH COLUMBIA.

There has hardly been time for a readjustment of the currents that influence the metal markets. An increased demand for silver is confidently expected at an early date. Copper is holding its own, with a tendency towards improvement. The lead market is daily showing renewed strength. For all the metals a rapid recovery—possibly too rapid a recovery—is predicted.

The election of Mr. Taft to the Presidency of the United States has been accepted as indicating that there will be no undue interference with present conditions on the part of the chief executive.

The Canadian elections scarcely left a ripple behind them. In lieu of sharply defined issues, the opposing parties appealed to the country with sentiment and scandal respectively. Sentiment won.

All of which signifies that, whereas a few weeks ago the country was in a state of suspended animation, from now on there will be renewed confidence and widening spheres of activity.

The mines and smelters of Southeastern British Columbia are sensitive to all changes in the prices of metals to a larger extent than obtains in any other section of Canada. It is cheering, therefore, to note that there is a sound economic basis for the vigorous expansion that is reported from Nelson, Sandon, Phoenix, Trail and other centres.

British Columbia has cut its wisdom teeth, and can handle a sanely constructive boom without danger to itself or others.

IRON ORE BOUNTIES.

Mr. James Conmee, M.P., speaking before the Canadian Club of Port Arthur, on Thanksgiving Day, expressed the hope that Canada would develop her vast mineral resources. The iron ore bounties, Mr. Conmee stated, should be fixed upon a sliding scale. He expressed the opinion that the bounties upon products into which foreign ores entered should gradually be wiped out, leaving those on Canadian ores still in effect.

Some such plan as this has much to recommend it. The bounties will have accomplished little good if they do not lead to the development of our own iron ore deposits.

EDITORIAL NOTES.

The tailings wheel will probably be superseded on the Rand by a tailings elevator.

British Columbia can safely boast of a scarcity of wildcat mining schemes. In her day she has had not a few. Now, however, with her mining and smelting enterprises largely under competent and responsible technical men, the howl of the feline is scarcely heard.

During the first eight months of the year 1907, the British Columbia Copper Company completed 3,667 feet of diamond drilling. In the month of March the average cost per foot reached the low figure of $1.045. In that month 540 feet were drilled in ore and lime rock, 200 vertical, 340 horizontal. The ore and some of the limstones were medium hard. Electric power was used.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

(Continued from last issue.)

Dominion No. 2 Colliery.

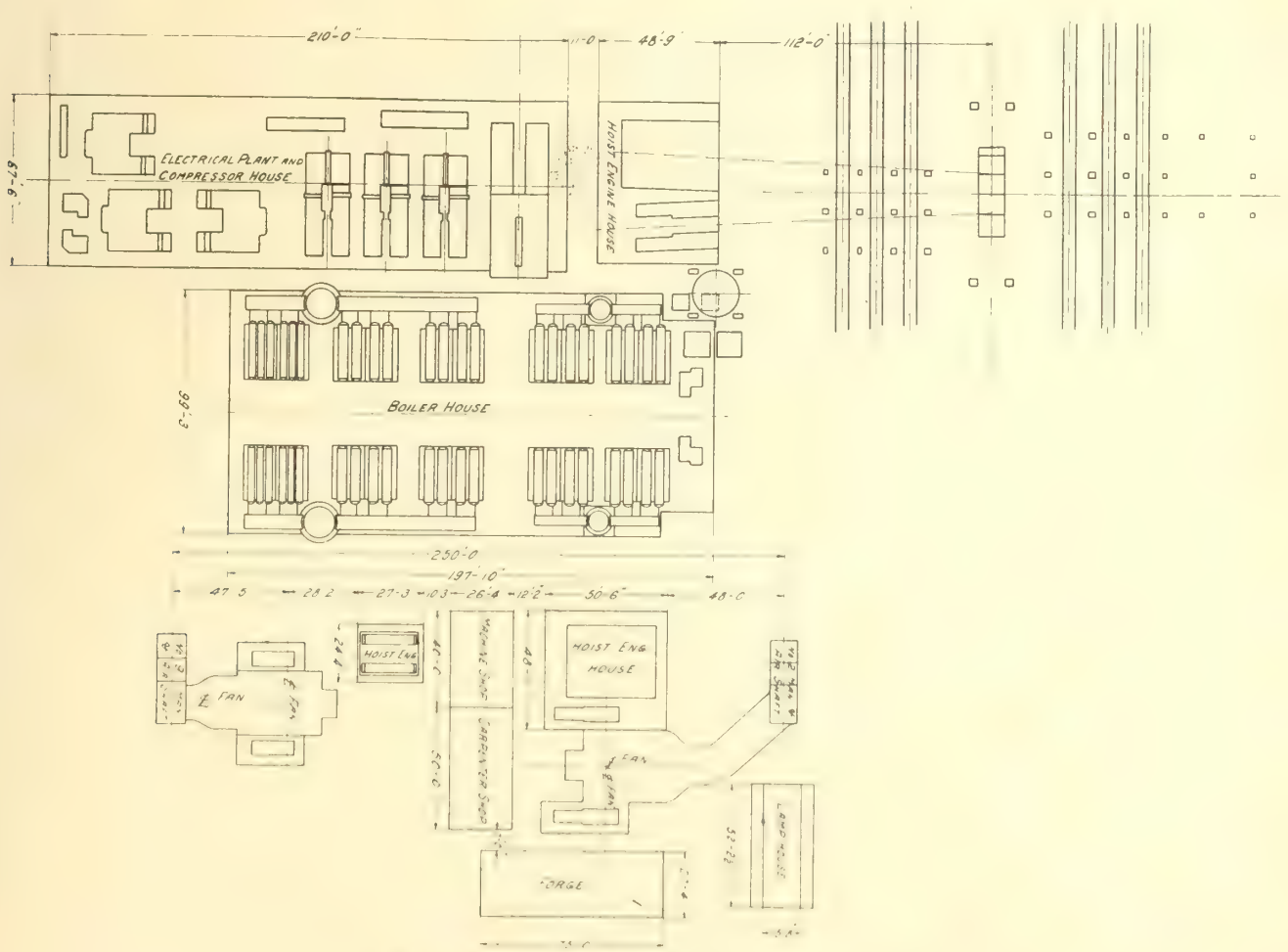
Dominion No. 2 is justly regarded as the show place among the Dominion Coal Company's collieries. It involved a very large capital expenditure, and everything was designed on a large and elaborate scale. Its central position has tended to emphasize its general importance, and successive accretions such as the Central Electric Plant, the Central Horse Hospital, and the Central Rescue Station have added to its growth from year to year. It is a cardinal article of belief in Glace Bay that Number Two is the largest colliery in the world.

Two seams are worked here, the Harbor and the Phalen. The same shaft opening and surface erections serve for the two seams. This description will deal with the whole colliery, excepting only the workings of No. 9—the Harbor seam—which will be referred to when considering the Harbor seam generally.

The hoisting shaft was sunk exactly on the outcrop of the pavement of the Hub seam. The following section gives actual measurements down to the Phalen pavement; below that the figures given are estimated from the best available data:—

	Coal and Measures. Feet.	Total Depth. Feet.
Hub Seam	9.6	
	404.6	
Harbour Seam	5.6	410.0
	253.3	
Boutilier Seam	3.9	667.0
	73.5	
Back Pit	2.7	743.0
	115.6	
Phalen Seam	8.6	867.0
	160.0	
Emery Seam	4.6	1,031.0
	91.0	
Small seam (McRury?).....	2.0	1,124.0
	209.0	
Lorway Seam	4.6	1,137.0

Below the Lorway or Gardiner seam lie at least three other workable seams, shown on the geological map as the Clarke, Martin and Mullins seams. Their



Plan V.—Dominion No. 2 Colliery. General Surface Lay-out.

positions and value are not, however, fully proven, and it will not be until the thicker and more profitable seams of the Sydney coal field are worked out that much attention will be paid to the lower seams. Neglecting these lower seams, however, there are at least seven workable seams of coal from the Hub to the Lorway, all easily accessible, giving an aggregate thickness of nearly forty feet of coal in the comparatively shallow depth of 1,200 feet.

The seams are so spaced that they can be worked without seriously interfering with each other, if the workings are properly laid out and ordinary precautions are taken. It is to be expected that the section shown at this point is largely that which will be found under the vast submarine areas lying off Table Head.

The shafts of No. 2 were sunk at a point where the regular contours of the Glace Bay Basin begin to be influenced by the turning up of the measures towards the Bridgeport anticline. The axis of the trough is about 1,000 feet to the north of the shafts, and indications are that the axis runs parallel to the line of the anticline and proceeds out to sea in a direction almost due east.

The sinking of the shafts was commenced in October, 1899. The Phalen seam was reached in the following June, and the regular hoisting of coal dates from 1902, since which time the Phalen seam has produced three and one-half million tons. The present monthly output is 70,000 tons, and 3,221 tons have been hoisted from the Phalen seam in one day. The largest tonnage obtained in one day from both the seams was 5,1000 tons. The territory at present allotted to No. 2 will give an ouput of 800,000 tons per annum for a period of over fifty years from the Phalen seam.

Plan A will give a general idea of the surface layout and the extent of the equipment.

The power plant consists of 20 Babcock & Wilcox boilers, rated at 6,360 horsepower. They are fired by Jones's underfeed stokers, which are fed by hand at the present time. It is probable that a coal-handling plant may be erected at a future date. The forced draft is obtained from two 8-foot Sturtevant blowing fans. The two large smokestacks are of steel, 70 feet and 75 feet high, 9 and 10 feet diameter, respectively.

The motive power for underground use is entirely compressed air, and the compressing plant is a very large one. The compressor house is of steel frame construction with walls of concrete and expanded metal. An addition was built in 1906 to house the Central Electric Plant, which will be later referred to. The new portion of the building is of steel frame and brick construction. The whole building is 210 feet long by 67 feet 6 inches wide, and 30 feet high.

The air compressors in the building are as follows:

One Walker compound compressor, steam cylinders 31 by 57 inches, air cylinders 32 to 51 inches, stroke 60 inches, capacity 3,000 cubic feet per minute.

Three Rand compressors, compound, steam cylinders 36 by 20 inches, air 32 by 20 inches, stroke 48 inches, each delivering 3,000 cubic feet per minute.

Two straight-line Norwalk compressors.



Dominion No. 2.

The total air compressing capacity is about 16,000 cubic feet per minute.

The bankhead is a large structure, 120 feet high to the top of the tower and 132 feet to the centre line of the pulley axle. It is constructed entirely of steel on concrete foundations, and is of exceedingly stiff and rigid design. It is covered with corrugated iron, which has deteriorated rapidly under the influence of the weather and sea air, but the actual structure of the bankhead itself is in excellent repair, and it is said to vibrate less than any of the other bankheads.

The Phalen hoisting engine is a 34 by 48 inch horizontal double engine, with slide valves, made by the Dixon Co., Pennsylvania. The hoisting drum is 10 feet 4 inches in diameter by 5 feet 7 inches on the face. The hoisting rope is 1⅝ inches in diameter, passing overhead pulleys 12 feet in diameter. These pulleys have 36 spokes 13⅛ inches in diameter. The axle is 9½ inches in diameter.

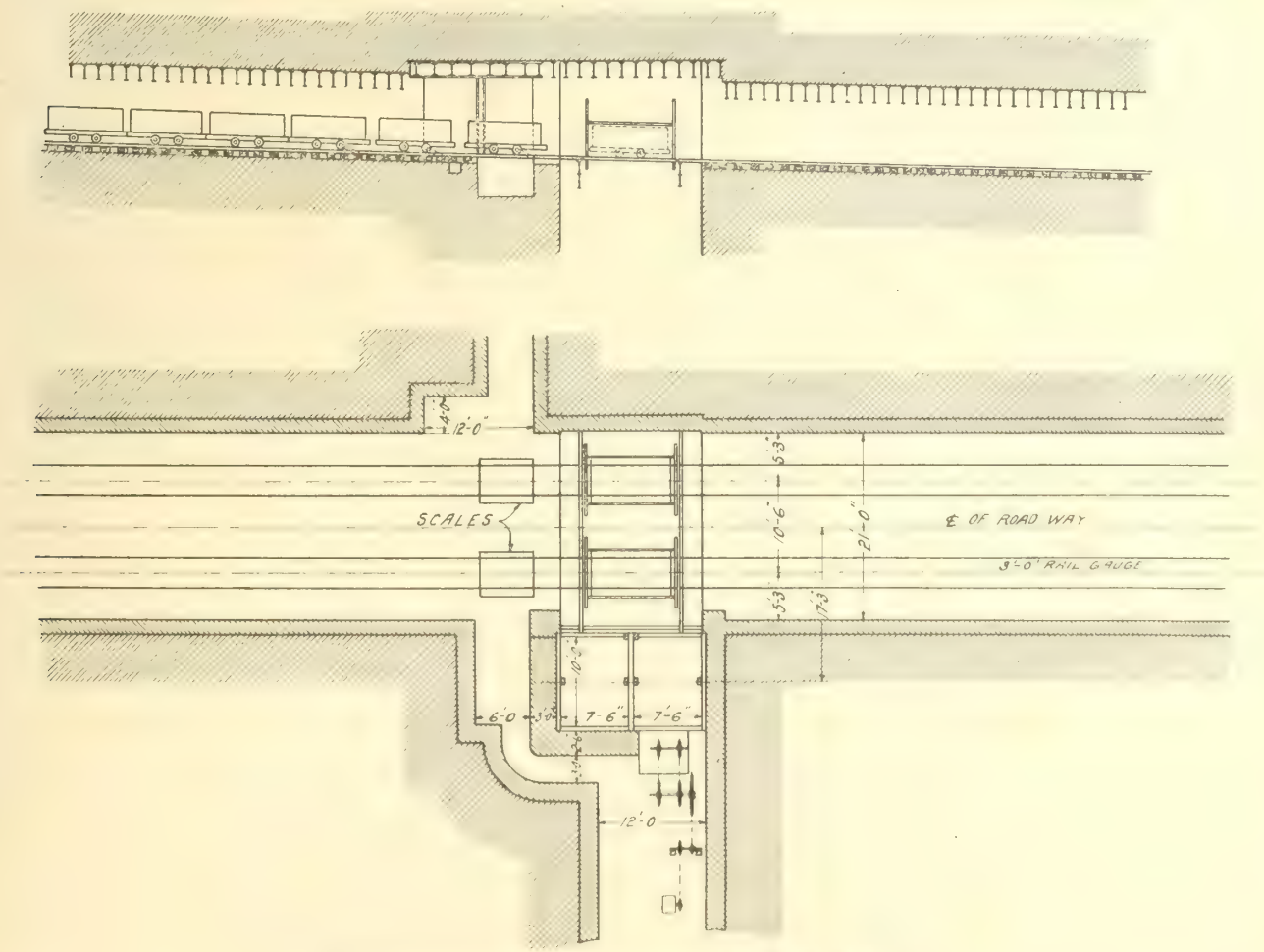
The Harbour hoisting engine is a 24 by 42 inch horizontal double engine with Corliss valve gear, made by the Jenckes Co. The rope is 1⅜ inches in diameter, and the hoisting drum 8 feet in diameter by 6 feet 4 inches.

Both these engines are housed in one building, built of steel framework and reinforced concrete, like the compressor house.

The hoisting arrangements are very interesting, particularly those for the Phalen side. The main hoisting shaft is 11 feet by 37 feet over all, divided into five compartments, two for the Harbour, two for the Phalen, and one for a pipe compartment.

The coal is brought to the shaft bottom in tubs of 2 tons capacity. It is weighed in the bottom (see Plan B), and the tubs run by gravity into the tipples, which are operated by compressed air. The tipples dump the coal into two storage chutes (see Plan C), which are so arranged by means of doors that the coal from either tipple can be put into either chute. The chutes have an inclination of 50 degrees, and the coal is retained in the chute by a swinging door fastened by a spring latch. The door is actually kept in the closed position by a counterweight passing over a pulley, the shaft of the pulley forming the hinge of the door. The counterweight is attached to a chain passing over the pulley and drawn tight across the shaft bottom, in such a position that when the cage descends the lower framework impinges upon the taut chain and draws down the door of the storage chute, which then becomes a continuation of the chute, over which its contents are discharged into the hoisting tank. By means of the lever arrangement shown, the spring latch is released by the descending cage some little time before the bottom of the cage touches the chain which operates the storage chute door.

The hoisting tank is a boxlike receptacle, with an inclined floor mounted on a pivoted framework arranged like the ordinary self-dumping cage. There are two sets of guide spears for the hoisting tank, one for the main side shoes attached to the outer framework of the arrangement, and a smaller set of spears which pass between roller guides attached to the tank itself, and serve to keep the tank from dumping should the lock slip in transit. On reaching the top the lock of the tank is released by a catch, and the tank lunges forward, tightening the side chains and opening the door of the tank, automatically discharging the contents on to the screens. The hoisting tank has a capacity of between 7 and 8 tons, but the normal load is 6 tons. The tank and framework weigh about 10 tons, which, added to the weight of the coal being hoisted, gives a total dead weight on the rope of about 16 tons. The entire arrangement is automatic from the time the tubs leave the scale to the operation of discharging the coal on the screens. Any coal that falls from the chute drops to the bottom of the shaft, and is there lifted by a bucket conveyor to the level of the pit bottom, where it is reloaded into tubs. This dropped coal does not amount to more than four tons per day.



Plan B—Plan and Elevation of Dominion No. 2 (Phalen) Pit Bottom

The hoisting arrangements of the Harbour seam consist of the ordinary self-dumping cage, and are similar to those already described at other collieries.

As the hoisting shaft is used exclusively for coal, two man shafts are provided for the two seams. Each of the man shafts serves both for the conveyance of men and for ventilating purposes, being divided into three compartments, namely, two for hoisting and one for intake air. All the hoisting shafts are used for the upcast air, in accordance with the usual pretice here. The heated upcast air prevents the formation of ice during the winter months, which would otherwise interfere very seriously with the operations. The hoisting engine of the Phalen man shaft is of the same design as the coal hoist, before described. The Harbour man hoist is a horizontal double engine 18 by 26 inch, with slide valves, made by Matheson, of New Glasgow.

The workings are ventilated by two fans; one for each seam. The Phalen fan is a Walker fan, 24 ft. dia. by 8 ft. 6 inch. across the face of the vanes. It has a rated capacity of 350,000 cub. ft. per min. at 3 inch W.G. It is cased in brick and is directly connected to a horizontal engine 20 by 42 inch., which is contained in the same engine house as the hoisting engine for the Phalen man shaft. On the other side of the fan is a brick house containing a duplicate engine as an auxiliary in case of breakdown. The Harbour fan is of similar capacity, of the Guibal type, and is cased in steel. It is directly connected to two engines, one of which is in use, the other being reserved for emergencies.

Among other surface erections are the following:

The lamphouse is 52 feet long, and has a concrete floor. It contains 1,700 safety lamps, all of the A. & B. type, with the necessary cleaning, filling and igniting apparatus.

There are also large machine, blacksmith and carpenter shops, similar to those at other collieries already described.

Some little distance away from the main buildings is the Wash House, which contains 66 lockers and is the largest of the company's wash houses. It is 120 feet long by 30 feet wide.

The whole of the motive power used underground is compressed air, and all the coal is cut with the ordinary "puncher" machines.



Dominion No. 2

No. 2 is the only one of the coal company's mines which uses compressed aid locomotives for haulage purposes. The following is a list of the locomotives in operation at the present time:

No.	Mkr.	No. of whls.	Wght.	Cylinders.	Length.
1	Porter	Four	7 tons	7" x12"	13 ft.
1	Porter	Four	10 tons	7" x14"	18 ft.
3	Porter	Four	15 tons	10½"x14"	19 ft.
1	Baldwin	Six	17 tons	11" x14"	20 ft.
1	Baldwin	Six	20 tons	11" x14"	23 ft.

The mine cars in use have a capacity of 2 tons. The gauge is 3 ft. 0 inch, and a 56 lb. rail is used on the motor roads, which have to be very solidly laid and ballasted.

The main pit bottom extends for a distance of 200 feet on the empty side of the shaft, and for a distance of 300 feet on the full side. Over the whole of this 500 feet the sides are concreted, the walls averaging 1 ft. 6 inch. in thickness. The roof is supported by I beams. 24 inch. by 25 ft. span, spaced with from 1 ft. 6 inch. to 4 ft. 0 inch. centres.

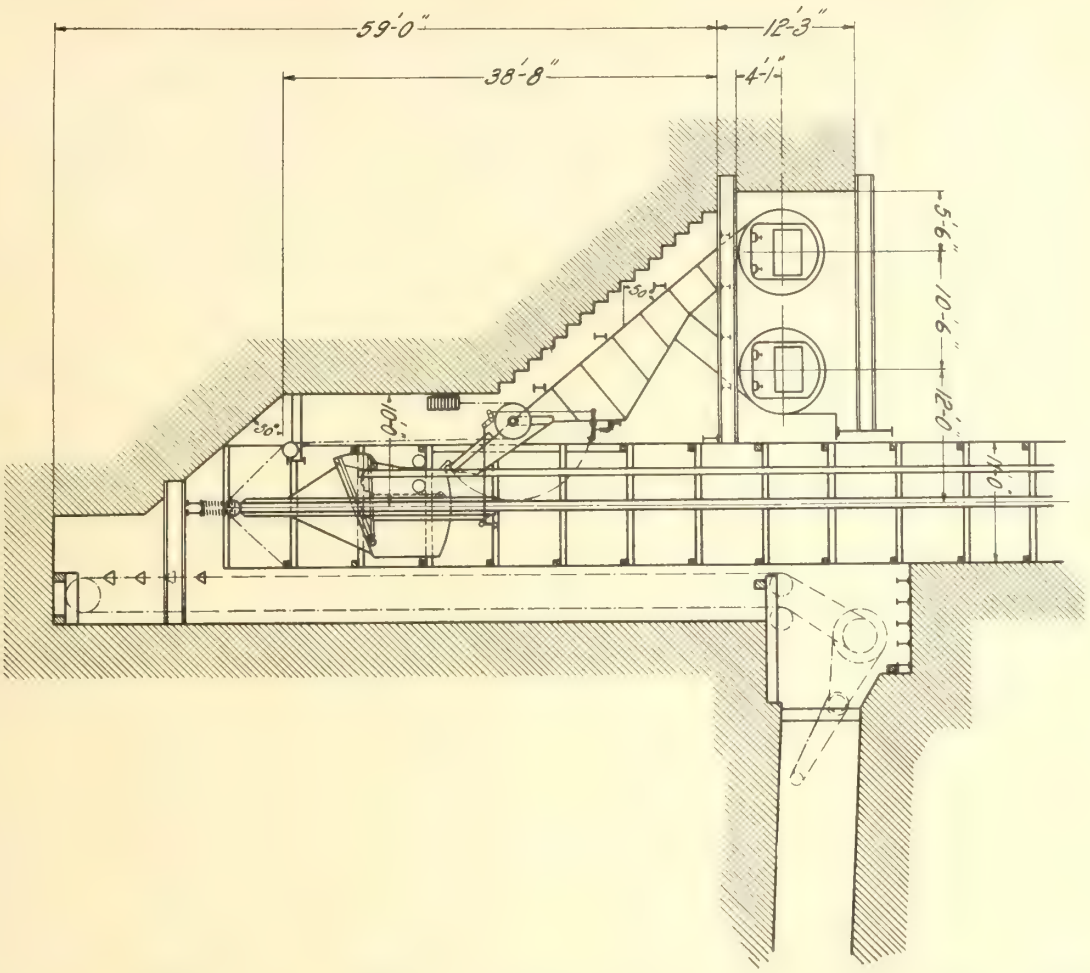
The air mains are so arranged that they can be used as water mains. Owing to the depth of No. 2, the Phalen seam is fairly dry and the heavy system of haulage in use there tends to create fine dust on the haulage ways. Every precaution is used to lessen the amount of dust, and the amount is periodically sprayed with water, more frequently in the winter months than in the summer months, owing to the greater dryness of the air in winter. In some sections the dust is swept up and taken out of the mine altogether to be used at the fires. "Permitted explosives" are used exclusively, and wherever gas is reported the firing of shots is discontinud until the place is reported clear.

The mine employs about 100 horses, and has a force of a little less than 1,000 men.

Outside the colliery fence is the Central Rescue Station, elsewhere referred to, and the Firemen's Hall. The men of No. 2 and 9 collieries have taken up the work of training in the use of the Draeger apparatus with a good deal of enthusiasm, and they were well represented in the contingent that were sent over to Sydney Mines. In striking contrast to all the modern appliances at No. 2 we noticed near the Compressor House an old Shand & Mason manual fire engine, which looked as though it had strayed from some museum of antiquities.

The town of New Aberdeen is owned by the Coal Company, who have about 730 houses at this place, including the houses of the men employed at the Hub Colliery. There are also two large boarding houses owned by the company. For a good many reasons the population near No. 2 is more cosmopolitan than at the other mines, and in addition to the native and British element one can find Germans, Poles, Hungarians, Italians, Russians, Belgians, and Frenchmen, many of whom are old residents at New Aberdeen.

Central Electric Plant.—In 1906 an addition was made to the Compressor House for the housing of a central electric generator station. There are three generating units, consisting of a Westinghouse Alternator, 550 K.W., 25 cycle, 3 phase, 125 revolutions per minute, 6,600 volts, directly coupled to a compound Goldie-McCulloch horizontal engine of 700 I.H.P. The high pressure cylinder is 20 inches, low pressure engine 40 inches, stroke 26 inches. The fly-wheel is 14 feet in diameter and weighs 60,000 lbs. The extension is arranged to admit of another unit when required. There are two exciters made by the Westinghouse Company, 75 K.W., directly connected to 12 x 12 Ideal engines. The switch-board is of black marble, eight panels. The power generated at this station is used for pumping purposes, for driving screen machinery and for colliery lighting. It is also used for driving the machinery in the Central Shops at Glace Bay. The transmission line poles are 35 ft. high, spaced not more than 100 ft apart. The wire used is 4 in. x 0 in., of bare hard-drawn copper. The drop in voltage experienced is about 5 per cent.



Plan C—Dominion No. 2 Colliery. Sketch of the Hoisting arrangements on the Phalen Seam, showing Tipples, Storage Chutes, Hoisting Tank, and Guide Spears

The transformer houses at the collieries are built of hollow glazed earthenware blocks. A typical house is 13 feet high by 23 feet long and 17 feet wide. The roof is made four ply, 1¼ inch T. & G. covered with tar and gravel, sloping. Each house contains three 75 K.W. Westinghouse transformers, rated 3800/317 volts. The boreholes for the conveyance of electric current are drilled 9 inches diameter, cased to 6 inches. The cable for borehole transmission is usually No. 4-0 lead covered paper insulated cable.

Central Horse Hospital.—Near No. 2 Colliery is situated also the Central Horse Hospital. This building is under the charge of the veterinary surgeon of the Coal Company, who is responsible for the care of the Coal Company's horses, which number between six and seven hundred, according to the season of the year. The building contains stalls for eighteen horses, and is fitted with concrete bath for the treatment of diseased animals, and all the modern appliances for veterinary surgery. A shoeing shop is close by, where all cases of special or pathological shoeing are done under the direction of the veterinary surgeon. The veterinary surgeon also keeps his stock of horse medicine here, and it is used as a general distributing centre.

LABORATORY ROUTINE IN MODERN COPPER SMELTERS

Paper read before the Institute of Mining and Metallurgy

By H. T. Waller, Member.

The following brief description of some of the laboratory methods which the author has found most useful in connection with copper blast furnace smelting may, it is hoped, be of interest to members of this Institution. They do not by any means cover the whole of the work which the smelter chemist may be called on to do, which is, of course, extended over a very wide field. They deal, however, with the determinations which will constitute the bulk of his work at all times, and which will, owing to the volume of work and speed required, probably cause him the most anxiety at first.

What may be called the daily routine work of the smelter chemist consists in making more or less complete analyses of such samples of ores, fluxes and furnace products as may be required for the immediate use of the superintendent in charge. He will have to determine, at least daily, and sometimes more often, the principal constituents of the slag, and make frequent

determinations of copper in the matte produced by each furnace, besides making endless determinations of copper, silica, iron, lime, sulphur, zinc, etc., in ores, briquettes, flue dust, etc.

In the following scheme the analysis of slags has been considered first, as characteristic of the rest of the work. Except in special cases ½ grm. is always taken for analysis, and standard solutions are made up so that 1 cc.=1% of the substance to be determined on the ½ grm basis.

Analysis of Slags.—Copper slags, which have been properly chilled and crushed to 100 mesh, can be completely dissolved in dilute HCl when the silica is not above 40 to 45%. Only those samples which have cooled slowly and crystallised, like those taken from the dump, or those which are very highly silicious, will require fusion with alkalies for their decomposition.

Slag is sampled at the furnace by dipping a small iron rod into the stream of slag as it flows from the settler, and plunging the rod immediately into a bucket of water, or by catching some of the slag in a small iron ladle and pouring it into the water. A sample is generally thus taken every hour from each furnace. The buckets in which the samples are collected must be provided with well-fitting covers and should be kept covered as much as possible, or the sample will certainly be contaminated by splashes of matte or other cupriferous matter.

Slag which has been chilled in water is entirely different in appearance from that which has cooled slowly. It is perfectly amorphous throughout and very brittle, with a shiny conchoidal fracture. Badly-chilled slag can often be detected by its dull appearance even when finely powdered. As a regular thing the slag is analysed every 12 or 24 hours for copper, silica, iron, lime, and less frequently for zinc, sulphur, alumina and other constituents.

These determinations may be made for five or six furnaces in about two hours in a well-arranged laboratory, the chief requirements of which are, a good hearth or hot plate under a hood of fume cupboard, an arrangement for cooling flasks, beakers, etc., in running water, several Dangler blast lamps, or their equivalent, for fusions and ignition of precipitates and a row of filter flasks connected to a vacuum filter pump. For a convenient hot water supply one or two large copper tea kettles can hardly be surpassed.

Determination of Copper.—The copper present in blast furnace slags is seldom less than 0.1% or more than 0.8%. It may be determined colorimetrically as follows:—2 grm. of slag are placed in a small beaker and 50 cc. of hot water added; 15 cc. HCl are added at once while the slag is kept in suspension by vigorous stirring. Practically all the SiO_2, Fe, CaO, etc., is dissolved and can be filtered off from the black residue, which consists of copper sulphide and a little partly decomposed slag and matte.

The solution always smells strongly of H_2S, which ensures that the copper will remain insoluble. It cannot be depended on to filter quickly unless a filter pump is used, as there is often unavoidably a slight separation of gelatinous silica. The paper is ignited thoroughly in a Berlin crucible, no organic matter being allowed to remain or it will give the final copper solution a grenish tint which renders the determination worthless.

The residue is brushed into a beaker, 5 cc. HNO_3, and a few drops of HCl are added and boiled till red fumes cease to come off. It is diluted, 20 cc. of ammonia are added, boiled and filtered into a colorimetric bottle. A double precipitation with ammonia is not necessary, as the amount of iron to be separated is very small and does not carry down appreciable amounts of copper. The iron present at this stage is derived, as also is most of the copper, chiefly from shots of matte which have been included in the slag.

The standard colorimetric bottles are generally made up about once a month. They do not alter appreciably in color over a much longer period, but the ammonia attacks the glass, forming a flaky precipitate which if shaken up in moving the bottles about will cloud the solution. They are quickly renewed at any time as follows:—

0.5 grm. of copper is dissolved in a little HNO_3, the red fumes are boiled off and it is diluted to 500 cc. 10 colorimetric bottles are taken, labelled 0.1, 0.2, 0.3, etc. 5 cc. of HNO_3 are added to each, then diluted, and from a burette 1 cc. of the above solution is added to the first, 2 cc. to the second, and an additional 1 cc. to each successive bottle. 20 cc. of ammonia are added to each bottle, after which they are filled with water up to the bottoms of the labels, which are placed at the same level, so that the bottles contain about 150 cc. of solution.

The bottles are placed on a level with the eye on a narrow shelf covered and backed with white paper or tiles. It is very important that there should be only one source of light, and that it should be directly behind the observer when comparing colors. There should be space enough on the shelf between the standard bottles to allow of introducing the bottle to be tested, which is moved along till its place in the series is determined.

Since 2 grm. of slag have been taken, the fraction on the bottle corresponding divided by two will give the required percentage of copper in the slag.

A useful exercise for anyone employing this method for the first time is to place the bottles on the shelf so that the labels cannot be seen, and then to move them about at random, until the original order is destroyed. When the beginner finds that he can replace the bottles in their proper order with certainty, without looking at the labels, he will have considerable confidence in his results.

This method is very rapid, a batch of six samples being easily done in half an hour or so, the chief delay being in igniting and cooling the porcelain crucibles. The results are excellent, for though an individual determination may perhaps be 5-100 of a per cent. out through difficulty in exactly comparing the colors, the average result will be very much closer than this, as may be proved by making a composite sample of the slags done, say once a month, and determining the copper on the battery, or by some other more exact method.

Probably the only serious rival to the method given above, for separating the copper from slag, is that in which the silica is volatilised by evaporation with hydrofluoric acid.

This method has the advantage that it can be used on slags which are insoluable in HCl. It is, however, a somewhat tedious process, and necessitates the use of a re-agent, which few will care to employ if it can possibly be avoided. Then, of course, the hydrofluoric acid treatment still leaves the copper to be separated from the iron by some other means. The method here given is indeed unique in the facility with which the copper is at once separated from large amounts of iron and silica.

Determination of Iron.—The bichromate method serves all purposes for iron determination. The end reaction is quite sharp and decisive in practised hands, though, perhaps, a little tedious, which fact has led some to prefer the permanganate titration; but the great advantages in speed and reliability which the method possesses over all others entirely counterbalance this defect. 0.5 grm. of slag is placed in a beaker, 25 cc. of boiling water are added. The beaker is placed on a hot plate and stirred vigorously to keep the slag in suspension while 20 cc. of strong HCl is being added.

It is stirred till there is no longer of gelatinised slag sticking to the bottom of the beaker, and boiled for a few minutes to remove H_2S. While still hot two or three drops of $SnCl_2$ solution are added until the solution is colorless, then an extra drop or two are added, and the beaker is cooled rapidly by standing in running water. It must not be allowed to stand longer than necessary, as, when cold, the iron will oxidise even in the presence of an excess of tin chloride.

When cold, 20 cc. of saturated $HgCl_2$ solution are added, and after alowing to stand about a minute it is titrated with $K_2Cr_2O_7$. The mercuric chloride solution should produce a beautiful silky precipitate. If the precipitate is dense or heavy it shows that an unnecessary amount of tin chloride has been added. The whole determination can be done in ten minutes.

The tin chloride solution required for reduction will keep well if made up as follows:—1 lb. of stannous chloride is dissolved in 500 cc. of HCl and diluted gradually up to 2 litres. A small quantity is kept for use on the bench in a 2-oz. Schuster dropping bottle. The potassium ferricyanide indicator should be quite dilute, 0.1 grm. of the salt being sufficient for a 2-oz. Schuster bottle, in which the solution will keep well for a week or more.

The standard solution contains 4.392 grm. of $K_2Cr_2O_7$ per litre. It is standardised against pure iron wire by dissolving in HCl, reducing with $SnCl_2$, and treating as above described. 1 cc. of the solution= 0.005 grm. of iron, or 1% where 0.5 grm. of slag is taken.

Determination of Silica.—0.5 grm. of slag is moistened with about 20 drops of water in the bottom of a 3½-in. casserole. 5 cc. of HCl are added, while the slag is kept rubbed up with a short flat-topped glass rod, the casserole being placed on the hot plate and heated while stirring all the time until the silica belatinisies. This takes place in about half a minute, when the casserole with the rod in it is taken to complete dryness.

A perfectly safe and rapid way of evaporating to dryness in an open casserole, is to place it on a ring which supports the casserole just above but not touching the hot plate, while it keeps the sides of the casserole surrounded by very hot air.

Excellent rings can be made by cutting a round hole in the botttom of the small tin dishes which are often supplied for drying samples, or they can be made in the form of a short truncated cone of tin plate. It is convenient to have a dozen or more of these evaporating rings, as they are useful in many determinations.

When nearly dry, and there is no more danger of spitting, the lumps of gelatinised matter may be broken up with the rod, and the casserole placed directly on the hot plate until all sign of HCl fumes has disappeared. The residue, after cooling, is moistened with 5 cc. of HCl, a few drops of HNO_2 are added, it is diluted with hot water filtered with the aid of a filter pump, ignited and weighed.

Determination of Lime.—Lime is determined in the filtrate from the silica as follows:—The filtrate is transferred to a beaker heated to nearly boiling, a decided excess of ammonia is added, then solid oxalic acid is added from a teaspoon, stirring until the ferric hydrate has all dissolved. Ammonia is added again till there is a slight permanent precipitate of ferric hydrate, and the solution again cleared by the careful addition of small quantities of oxalic acid. It is boiled and filtered. The filter and precipitate is placed in a beaker containing 10 cc. of H_2SO_4, which has been diluted, first with a little cold water, and then with 100 cc. of boiling water. It is titrated at once with standard potassium permanganate solution, of which 1 cc.=0.005 grm. CaO, or 1% CaO when ½ grm. of sample has been taken. The standard solution contains 5.991 grm. of $KMnO_4$ per litre.

To standardise with oxalic acid, a few crystals between 0.1 and 0.2 grm. of oxalic acid are weighed out and dissolved in a beaker of hot dilute H_2SO_4, as was the calcium oxalate precipitate, and titrated at once in a similar manner. The weight of the oxalic acid taken x0.444 gives the equivalent weight of CaO.

Standardisation with metallic iron should be made at least as a check on a new bottle of oxalic acid. In which case $\frac{Fe}{2}$ = CaO.

Determination of Al_2O_3.—This is best done by direct weighing as phosphote, the method is practically as given by Blair for iron ores.

0.5 grm. of slag is taken and treated exactly as in silica determination until the silica has been separated and filtered off. The alumina, together with the iron, which must be in the ferric condition, is thus obtained in a hydrochloric acid solution. To the solution, which should occpy about 100 cc., 15 cc. of a saturated solution of microcosmic salt are added, and it is carefully neutralised with ammonia until a slight permanent white precipitate is obtained.

It is heated to boiling and carefully acidulated with HCl until the solution has cleared, taking care not to have more than about 2 cc. of HCl in excess, 25 cc. of a saturated solution of sodium thiosulphate are added, and 5 cc. of glacial acetic acid, or an equivalent amount of dilute acetic acid. The solution is now boiled for ten minutes, when a white precipitate which is easily filtered and washed, and consists of aluminium phosphate with sulphur, is obtained.

It is filtered over a filter pump, dried and ignited with its filter paper. It must be ignited very gently at first until the paper and sulphur are burned off, being finally brought to a bright red heat. The ignited precipitate is perfectly white and tender, and should show no signs of fusion. It consists of Al_3PO_4 and its weight in grm. x 84 gives the percentage of Al_2O_3 when ½ grm. of sample has been taken.

Determination of Zinc.—The method of Messrs. Von Schultz and Lowe, or its modifications, seem to be used almost universally for the determination of zinc in copper smelting.

0.5 grm. of slag is treated as in silica determination until the gelatinous silica is dehydrated. 20 cc. of a saturated solution of $KClO_3$ in nitric acid are added to the casserole, which is covered with a clock glass and taken to complete dryness on the hot plate. Just before solidification takes place the cover may be removed, drained, and left leaning up against the casserole, which is placed on an evaporating ring until all is dry. This prevents matter from spitting up and sticking to the clock glass, which would afterwards be a little troublesome to remove.

The main object of the powerfully oxidising chlorate mixture is to convert manganese into black oxide, which is insoluble during the subsequent treatment. To the residue in the casserole are now added 7 grm. of solid ammonium chloride, 20 cc. of ammonia, and 25 cc. of hot water in succession. The residue is now well rubbed with a rubber-topped glass rod until loosened from the casserole, and disintegrated and dissolved as much as possible. It is finally covered, and boiled for one minute and filtered.

The ferric hydrate thus obtained is in a very compact and granular form, and will carry down with it much less zinc than when precipitated out of solution in the ordinary way. It is, however, impossible to remove all the zinc in one operation if much iron is present, so if great accuracy is required the residue should be washed from the paper with a little water back into the casserole, evaporated to dryness, again treated with the chlorate mixture, reprecipitated exactly as before, and the two filtrates combined for further treatment. If copper is present, as shown by the blue color of the ammoniacal filtrate, HCl is added carefully until the color has just disappeared. If not, the neutralization is effected with the aid of litmus paper.

In either case 10 cc. excess HCl is added. If copper is present, about 20 grm. of granulated lead are added, and the solution boiled for about five minutes, when the solution will be colorless, and all the copper precipitated. Instead of granulated lead a few pieces of test lead foil will do equally well.

The lead and copper need not be removed from the solution, which is now ready for titration.

The solution should occupy about 75 cc., and should be titrated at about 70° C.

The standard solution contains 22.5 grm. of $K_4Fe(CN)_6$ per litre. 1 cc.=0.005 grm. zinc.

To standardise the solution about 0.1 grm. of zinc oxide is weighed out, or, better still, an amount approximately equivalent to the amount of zinc in the portion of ore taken. The zinc oxide is dissolved in 10 cc. of HCl, and diluted to 75 cc. with hot water and titrated. The indicator, which is kept in a Schuster bottle for use on the spot plate, is an almost saturated solution of uranium nitrate.

Determination of Sulphur.—Sulphur is always weighed as $BaSO_4$. 0.5 grm. of slag is treated in a covered casserole with 10 cc. of strong nitric acid, warming gently, and adding from time to time a few crystals of $KClO_3$. When all action has ceased the casserole is placed on an evaporating ring and taken nearly to dryness. 10 cc. of HCl are then added and taken to complete dryness to render the silica insoluble. It is finally taken up with hydrochloric acid, diluted with hot water, and filtered.

The filtrate is made alkaline with ammonia, and about 3 grm. of barium chloride are added. It is boiled for a few minutes, acidulated with HCl to re-dissolve the iron, again boiled for several minutes and allowed to settle well before filtering.

Barium sulphate can in this way be separated in one operation from solutions containing large quantities of iron without contamination with the latter metal, as the iron is thrown out of solution before the precipitation takes place. With a reasonable degree of washing the ignited precipitate of $BaSO_4$ should be perfectly white and free from iron. The weight of the precipitate x 27.5 gives the percentage of sudphur when ½ grm. of sample has been taken.

Analysis of Ores and Fluxes.—Under this head are considered the determinations which have to be made on the various samples of ores, etc., about to be smelted or which it is proposed to purchase. The following substances have to be determined, if present, practically in everything that goes into the furnace: copper, silia, iron, lime, sulphur and zinc. Alumina is only required when present in considerable quantity (5% or more). It is weighed with and counted as silica under ordinary circumstances, the matter insoluable in acids being generally reported as "silica." The alumina will be determined, occasionally, in the ore from certain localities to enable a deduction to be made for it from silicia in calculating furnace charges.

Determination of Copper.—The cyanide method as given below may be used for ores, matte, fluedust, etc.

1 grm. of ore or 0.5 grm. of matte is heated in a small covered beaker with 10 cc. of nitric acid. In the case of fluedust, samples or those containing oxide of iron, a little HCl should be added to assist solution.

When action has apparently ceased, 10 cc. of H_2SO_4 are added and boiled till all the nitric acid has evaporated.

It is not sufficient to boil until heavy white fumes of sulphuric acid appear. The white fumes should be seen to come off freely for at least 10 minutes, or there is danger of considerable HNO_3 remaining in the solution. Very little of the H_2SO_4 actually boils away, as the beaker is kept covered. It is cooled and diluted to about 50 cc. A bent piece of 1-16 in. sheet aluminium about 1 in. square is placed in the solution and boiled briskly till all the copper is precipitated.

The above proportion of water to acid should be adhered to pretty closely, as a more dilute solution takes much longer to precipitate. Samples having much iron and little copper also take longer. The time varies from 5 to 10 minutes.

The aluminium is removed from the solution and washed; the copper does not adhere to it seriously unless the piece of aluminium has become pitted by being used a number of times. The solution is then given a vigorous rotary motion with a stirring rod, causing all the copper to settle in the middle of the beaker. The solution is decanted off as much as possible, more water is added, stirred round, and decanted as before. Two or three such decantations are sufficient to separate all the iron, etc., from the copper, which is dissolved in 5 cc. HNO_3, boiled, diluted, made alkaline with 15 cc. of ammonia, and titrated with KCN solution in the usual way.

The standard solution is such that 1 cc.=0.005 grm. of copper, or 1 cc.=1% when ½ grm. of sample is taken. It requires of 55.60 grm. KCN per litre according to the purity of the KCN used, and depending also on the operator, as two men will not as a rule agree as to the standard.

This is probably the most rapid and convenient method having any pretensions to accuracy. The author hos, however, frequently checked the work of careful assistants who were using this method, against the electrolytic method, and found that the results were very uniformly about 0.2% low.

Determination of Silica.—0.5 grm. of ore is heated in a covered casserole with 10 cc. of HNO_3 until action ceases. (The addition of a few crystals of $KClO_3$ greatly facilitates the solution of most sulphide ores.) It is then uncovered and taken to dryness on an evaporating ring. It is taken up by boiling with 10 cc. of HCl for a few minutes and diluting with hot water.

It is filtered over a vacuum pump, the filtrate reserved for iron and lime determination, and the residue ignited in its filter paper and weighed as "insoluble." This determination will in most cases be the only "silica" required for the smelter routine work.

There will always, however, be some ores on which a determination of true silica will be required. Such a determination necessarily occupies considerably more time. It is effected as follows:—

The insoluble residue is mixed in a platinum crucible with about 2 grm. of sodium carbonate and fused until all action ceases, preferably over a Dangler or other blast lamp.

The following procedure greatly facilitates the subsequent solution:—

Two pairs of platinum-tipped tongs are taken, one in each hand, and the contents are poured from the crucible on its lid. Both crucible and lid are then placed in a cesserole which contains about 40 cc. of cold water. The bulk of the melt which is on the lid really slides off, while the crucible only contains a thin film which is quickly dissolved out.

The casserole is placed in a hot place until all is dissolved or thoroughly disintegrated, when the platinum is removed and the solution acidified with an excess of HCl. The casserole is placed on an evaporating ring and taken to complete dryness, and silica determined exactly as described for silica determination in slag.

The only substance likely to contaminate the silica obtained as above, is barium sulphate. If present in the ore the aqueous solution of the melt should be filtered before adding HCl, great care being taken to ensure that all the silica is in solution. The filtrate is then acidified and evaporated for silica in the usual way.

Barium remains on the filter as carbonate and can be dissolved in HCl and determined as sulphate in the usual way. This will also apply to the silica determination in slag.

Determination of Alumina.—For the purposes of the copper smelter the difference between the "insoluble" and true silica may generally be taken as alumina, and in any case it is only the alumina in the insoluble portion that need be determined, as soluble alumina is not known to exert any harmful influence on copper slag.

When a determination is desired, the filtrate from the true silica, which contains the alumina in a hydrochloric acid solution, is treated for alumina by the phosphate method exactly as has been already described.

Determination of Iron and Lime.—These are determined in the filtrate from "insoluble," as follows: The iron is precipitated with ammonia in the usual way and filtered. The precipitate is washed from the filter through a hole made in the bottom with a pointed glass rod. Hydrochloric acid is poured on, and all the iron washed through with hot water.

The solution is heated, reduced with tin chloride, and iron determined exactly as described for slags.

To determine the lime an excess of ammonium oxalate is added to the ammoniacal filtrate from the iron. It is boiled for a few minutes, filtered, and the calcium oxalate precipitate dissolved and titrated as in slags.

Determination of Zinc.—The determination of zinc in ores is precisely the same as in slags, except that the treatment for the separation of silica is not required. Many ores can be treated directly with the chlorate mixture, but, as its action is very violent on some sulphide ores, it is best to warm gently in a covered casserole with about 10 cc. of nitric acid until the first violent action ceases, then to add from time to time a few crystals of chlorate of potash.

If globules of sulphur separate out, a few crystals or a little powdered $KClO_3$ thrown on top of the globules will cause them to go into solution at once. When all action has ceased the casserole is uncovered, taken to complete dryness, and proceeded with as before described.

Determination of Sulphur.—The solution of 0.5 grm. of ore is best effected in exactly the same way as described above in the determination of zinc in ores, great care being of course taken to see that no globules of sulphur remain undissolved. It is taken to dryness, boiled with HCl, and treated for sulphur as described under slags.

Analysis of Matte.—Though anything like a complete analysis of matte is but seldom required, a great number of copper determinations must be made daily in every smelter.

For iron, zinc and sulphur, matte may be treated exactly as has been already described for ores.

Matte is sampled by dipping a small iron ladle into the stream as it runs from the settler to the conveyor, and allowing the cake of matte to cool in the ladle. Two series of samples are usually taken. One series consists of samples taken every hour, which are collected together and made into a composite sample to represent the average matte produced during each 12 hours. These must be determined for copper by some reasonably accurate method, as the results are required for record in the daily reports, and for calculating the production of copper. Besides this, a series of special samples are taken about every two hours, and more frequently whenever required. The results of these spcial samples are used in the actual control of the furnaces, and must be produced with the greatest possible expedition.

It will be necessary to use, at least, two different methods for this routine work, apart from the most exact method obtainable, which will have to be used on shipping lots if matte is shipped from the smelter and sold as such. These latter are, perhaps, always done either by the iodide or electrolytic methods. These methods have been recently described by Mr. Lowe in his "Technical Methods of Ore Analyses," and fall outside the scope of the present paper.

The average day and night samples may be done by precipitation on aluminium, followed by cyanide titration as has previously been described, while, for the special samples, the most simple and rapid form of the cyanide method is usually employed, the matte being simply dissolved in nitric acid, and the iron separated by precipitation with ammonia. This method has two serious sources of error, some copper being invariably carried down with the iron, producing low results, while zinc, if present, as is most frequently the case, interferes with the method to produce high results.

Both these sources of error can, however, be counteracted, or, at least, minimized by standardizing the cyanide solution with a matte of similar grade and known copper contents.

The following procedure was employed by the author at the United States Smelting Co.'s plant at Kennett, California, and gave excellent results, though the zinc contents of the ore, and, consequently, of the matte, varied very considerably from time to time.

The calculation may seem to be a little complicated at first, but when made with the aid of a slide rule it gives practically no trouble at all, and is fully justified by the results obtained. The details of the method are as follows:—

0.5 grm. of matte is placed in a 10-oz. beaker, and boiled with 10 cc. nitric acid until action has ceased and the red fumes are driven off (matte, by the way, never completely dissolves in HNO_3, a black residue of magnetic oxide of iron being left which, however, is free from copper). 50 cc. of hot water and 20 cc. of ammonia are now added, and the solution brought to a decided boil and filtered through a 15-cm. filter on a fluted funnel into a 30-oz. flask, which is cooled by standing in running water, and titrated when cold with the standard KCN solution.

The average matte samples for the previous day and night are thus run every morning together with all the special samples taken through the night. At the same time the average samples (two for each furnace) are also weighed out into casseroles and determined by the more accurate method.

The subjoined table, arranged for one furnace, will show how the corrected results and the daily standard for the cyanide solution are obtained:

	Rapid Method cc. required.	Approx. Cu.	Al. Method. Cu.	Corrected Results
1. Average day	20.2	20.4	20.6	..
2. Average night ...	16.8	17.0	16.0	..
3. 6 p.m.	16.5	16.7	..	15.7
4. 8 p.m.	16.4	16.6	..	15.6
5. 10 p.m.	16.3	16.5	..	15.5
6. 12 p.m.	17.2	17.4	..	16.4
7. 2 a.m.	17.4	17.6	..	16.6
8. 4 a.m.	16.7	16.9	..	15.9
9. 6 p.m.	16.6	16.8	..	15.8

We will suppose that the standard as determined the day before was 1 cc.=1.01% Cu. The number of cc. in the first column multiplied by this factor gives the approximate results as in the second column. These results can be available early in the morning to show what has happened in the furnace during the night.

The third column shows the true percentage as determined by the aluminium separation for the day and night average samples, from which the new standard is obtained by dividing the true percentage by the corresponding number of cc. in the first column.

A change in the zinc contents has obviously taken place since the previous day, so the new standard is taken from the average night sample thus—

$\frac{16.0}{16.8}$=0.952. This factor is then taken to be used for the day for the special samples. The fourth column shows the special night samples corrected by its means.

The method cannot be expected to give very accurate results in case of a sudden change of zinc contents, but it is always possible to obtain a new standard by redetermining one of the special samples of the aluminium method.

MEETING OF THE TORONTO BRANCH OF THE CANADIAN MINING INSTITUTE

It is seldom that a more thoroughly representative body of mining men has been gathered for a meeting of the Toronto Branch of the Canadian Mining Institute than when, on the evening of November 19th, the Toronto members attended an informal dinner at the St. Charles Restaurant.

The guest of the evening was Mr. H. E. T. Haultain, whose appointment to the position of Professor of Mining and Metallurgy at the University of Toronto has been fully noted in these columns.

Before 7 o'clock the dinner was in full swing. In addition to the Toronto members there were present representatives from Montreal, Cobalt, and other branches.

When the dinner had been disposed of, the chairman, Mr. Eugene Coste, in a brief speech, alluded to the fact that the dinner had been arranged in honor of Professor Haultain. He then called upon Mr. G. R. Mickle, Provincial Assessor of Mines.

Mr. Mickle, as the former occupant of the chair of mining, tendered his congratulations to his successor. He was satisfied that Mr. Haultain would fill the position with honor to the University and to himself. He and Mr. Haultain had been students together. He had every reason to believe that Mr. Haultain could understand and sympathize with the vagaries and idiosyncrasies of his own students. Mr. Mickle concluded with a warm tribute to the vigor and ability of his successor.

Mr. J. B. Tyrrell was next called upon. After dwelling upon the need of radically modern methods of instruction in equipping mining students for present day work, Mr. Tyrrell assured Mr. Haultain of the support and sympathy of the mining fraternity under

all circumstances. "The appointment is one," said Mr. Tyrrell, "that merits and receives the fullest approbation of mining men."

The chairman next called upon Dr. W. G. Miller, who, in a most felicitous manner, dwelt upon the good fortune of the University in securing Mr. Haultain, and the equally good fortune of the Ontario Bureau of Mines in acquiring the services of Mr. Mickle.

Mr. Alex. Gray, of Montreal, spoke in terms of high appreciation of Mr. Haultain's appointment. He found it hard to determine whether the step meant more of gain to the University than of loss to the practical mining world. He desired, in conclusion, to touch upon a matter of national importance, a matter upon which clean mining men were of one mind. The present Cobalt boom had produced a distressing crop of wildcats. A few months ago the proportion of dividend-bearing shares sold and handled in Toronto and Montreal was about 86 per cent. of the whole. Now, however, the percentage had fallen to less than 34. This was an eloquent fact. Only the dissemination of mining knowledge and the hearty co-operation of decent technical men with the technical journals could remedy this. And a cure could not be effected in a month or a year; it must be a gradual and thorough process.

The guest of the evening was then called upon by the chairman. Mr. Haultain expressed his sense of gratitude for the honor that had been shown him as the incumbent of a most important office. When he had been a student at Toronto University no instruction in mining was provided. Now the whole scene was changed. The Department of Applied Science now takes care of about eight hundred students. The number of those studying mining branches in about one hundred. He had been surprised and gratified at finding such sound provision made in all the branches. The University had never advertised. The public knew little of what was being done. The members of the faculty had been kept busy providing for the phenomenal growth of the University. He wished to emphasize particularly the careful, quiet, but admirably farsighted work done by his predecessor, Mr. Mickle. Mr. Mickle had made no display; he had resisted all temptation to indulge in trimmings and frills. But he had laid the best and soundest foundation upon which his successor could work. The University generally and the Departments of Applied Science in particular were throbbing with the spirit of growth because of just such unselfish labors as those of Mr. Mickle.

Mr. Haultain continued his convincing and incisive speech with an urgent appeal to the mining men present to come and see what was being done and to take a more vital interest in the mining students, whose ideals and convictions they could do much to mould and crystallize. He then touched upon the criminal lengths to which promoters of nefarious mining schemes were allowed to go. He strongly commended the attitude taken by Mr. Gray, and deplored the indifference of many who could assist in eradicating the evils that are now so prevalent.

During the regular meeting that followed the dinner the following resolution was unanimously passed, and the Secretary of the Toronto Branch was instructed to forward a signed copy to Sir Wilfrid Laurier:—

A Resolution Passed at a Meeting of the Toronto Branch of the Canadian Mining Institute, Held in Toronto, on Nov. 19th, 1908, With Instructions That a Copy be Forwarded to the Right Hon. Sir Wilfrid Laurier, Prime Minister of Canada.

Resolved, That the Toronto Branch of the Canadian Mining Institute desires to testify to the sympathetic and constructive interest shown by the Hon. Wm. Templeman as Minister of Mines, and respectfully expresses the hope that in the interests of the mining industry the services of the Hon. Mr. Templeman be continued. The unanimous opinion of this branch is that a break in the continuity of the Hon. Mr. Templeman's work would be most regrettable. We desire, therefore, to express the hope that you will adopt such measures as may seem best to you to retain the Hon. Mr. Templemon in charge of the Department of Mines.

EUGENE COSTE, Chairman,
J. C. MURRAY, Secretary.

The following resolution also was presented and passed without a dissenting voice:—

Resolved, That in the opinion of this meeting, the promotion of fraudulent mining schemes, abetted by newspapers, is being indulged in to such an extent that the legitimate development of the mining industry is being very seriously injured, and, further, that this meeting learns with a great deal of pleasure that the Provincial Secretary has determined to see that henceforth all advertisements conform strictly with the provisions of the Ontario Companies Act. In the opinion of this meeting such a step will do much to curtail the operations of fraudulent speculators.

ALUMINIUM AND SOME OF ITS USES

By J. T. W. Echevarri, M.I.Mech.E.

(Paper read before the Institute of Metals, First Meeting, Birmingham, Eng.

Aluminium, although discovered as far back as 1827 by the German chemist, Woehler, was not used to any extent till the electrolytic method of extraction, invented simultaneously by Heroult in Europe and Hall in America, enabled it to be produced on a commercial scale and at a price comparable with the other common metals. Since then improved methods of manufacture have enabled the price to be still further reduced, till to-day aluminium is, bulk for bulk one of the cheapest of the common metals. The following table shows the steady fall in pric eduring the last twenty years:—

Price of Aluminium per ton.

	£
1889	3,256
1891	812
1892	495
1896	163
1901	130
1905	130-170
1907	200-160
1908	100-65

On its first appearance the new metal was hailed as a panacea for all the ills the metallurgist is heir to, and its use was proposed for every imaginable purpose, from armour plate to chemical chambers, and it was

this very exaggerated idea of its scope of usefulness which in the end militated against its employment for those purposes for which it is most suited, for its failure to stand up under obviously unsuitable conditions led to a general distrust in the new metal, which it has taken years to live down.

The enormous demand and consequent high price of aluminium during the copper boom of 1906-1907 also seriously affected its development; as many of those who would have been glad to use the metal were forced by its rising price to give up their projects or to turn their activities in other directions. This large demand, however, induced the manufacturers to lay down increased plant to turn out the metal in large quantities, the benefit of which we are to-day reaping in the very low price at which the metal now stands.

Manufacture.

Aluminium is now obtained electrolytically from bauxite, a clay containing a high percentage of aluminium oxide, cryolite being used as a flux. The chief improvements that have been effected since this method was first employed lie in the exclusion of the impurities contained in the raw material, for whereas formerly commercial aluminium rarely contained more than 98 per cent. of aluminium, most of that turned out by the British Aluminium Company, Limited, to-day carries close upon 99½ per cent. of aluminium, whilst metal with as little as 0.4 to 0.3 per cent. of impurities is obtainable for special purposes. For ordinary requirements, however, such high degree of purity is unnecessary, and does not repay the extra cost of manufacture.

Imprities.

The impurities commonly met with in aluminium are iron, silicon, and sodium. Silicon renders aluminium very brittle if present in large quantities, and this drawback does not appear to be offset by any corresponding advantage. Silicon also impairs the resistance to corrosion peculiar to pure aluminium, promoting the decomposition of the metal. In this connection it is interesting to note that the thin yellow coating which forms on the inside of cooking utensils is largely composed of silicon. In high-grade aluminium the percentage of silicon should in no case exceed 0.4 to 0.5 per cent., although the metal as used in iron and steel works may contain double this amount of impurity.

Iron occurs in high-grade aluminium to the extent of about 0.2 to 0.3 per cent., and whilst somewhat impairing the ductility of aluminium in the same way as silicon, the tensile strength is somewhat improved by its presence in small quantities. The presence of iron does not appear to affect the electric conductivity of aluminium to the same extent as silicon, but has a bad influence on its non-corroding properties. Sodium is the most injurious impurity to be found in aluminium, as the resistance to corrosion is seriously lowered by even small quantities of this metal. Improved methods of manufacture have, however, eliminated all but the minutest traces of this elemen,t till to-day more than 0.006 per cent. of sodium is rarely found, half this amount being the more usual figure.

Physical Properties.

The pure aluminium of commerce is a silver white metal, with a melting point of 657 degrees C., and a specific gravity ranging from 2.56 to 2.72, according to its method of treatment. Copper having a specific gravity of about 8.8, zinc about 6.9, and tin about 7.3, it follows that aluminium is about 3.3 times as light as copper, 2.5 times as light as zinc, and 2.7 times as light as tin. The heat conductivity of aluminium is high, being second only to copper among the common metals in this respect. Its electrical conductivity is also high, being from 60 to 62 per cent. of that of pure electrolytic copper; it having, like copper, a somewhat lower resistance when soft than when hard drawn.

Mechanical Properties.

The strength of pure aluminium depends to a large extent on its method of treatment, but the following tables gives average figures for the metal in various forms in tons per square inch:—

	Ultimate tensile strength.	Yield point.	Elongation p. ct.	Modulus of elasticity.
Sand castings	5.0	2.5	25	.....
Chill castings	5.25	2.5	35	.....
Rolled bars	7.0	5	35	.....
Rolled sheet	9.0	8.5	6	.....
Drawn sections	8.75	8.5	20	.....
Hard drawn wire	15.0	13.0	25	9,000,000
Soft drawn wire	7.0	4.0	30	10,000,000

Methods of Working.

Aluminium may be melted in ordinary plumbago crucibles over a coke fire, but where quantities are to be melted a reverberatory coal furnace is generally used. The metal should not be heated above 725 deg. C., to avoid "burning," as at this temperature aluminium readily oxidises with the oxygen in the air. Sheet iron can be re-melted by submerging in the molten metal, the loss being only from 2 to 3 per cent., which is much lower than in the case of brass and similar metals.

Aluminium can be cast in either sand or chill moulds, the latter method being generally employed where a good finish is required on small plain castings. Aluminium cast in polished steel moulds has a finish equal to the best machined surface. For rolling it is cast into large slabs or blocks, which are afterwards broken down hot, the intermediate and finishing stages being done cold, the amount of annealing being governed by the temper and finish required.

Aluminium can be easily drawn into sections, tubes and wires, more or less the same methods being employed as for copper. The billet is first rolled down hot to a convenient size, and afterwards reduced to the correct section on the drawbench, cold fat being used as a lubricant. For drawing down to the finer gauges in the wire-drawing machines, paraffin is employed as a lubricant. The amount of annealing during the process depends upon the temper required. Wires from ¾ in. to 0.018 in. diameter can be drawn in this manner, these being used for practically all purposes where copper, brass or German silver wire is used.

Sections, rods and tubes in aluminium can also be made by forcing the solid metal, at a temperature of about 80 deg. C., by means of hydraulic pressure through suitable dies, this method being economical only where a great number of lengths of the same section are required, owing to the cost of the plant necessary. Soft aluminium sheets can be spun, stamped, or pressed into various shapes, cocoanut oil or other lubricant being used.

For turning, a sharp-edged tool with a good clearance should be used, and the work run at a very high speed combined with a slow traverse, plenty of lubricant in the shape of soap and water or paraffin being

used. For drilling holes a diamond or nose drill with ample clearance should be used, a twist drill being liable to seize. Screw threads can be cut with an ordinary tap, using a little light oil as a lubricant.

Aluminium can be soldered by means of the various special solders now on the market, but as such soldered joints are all more or less subject to electrolytic action in the presence of moisture, they are only suitable when protected from damp air. Welded joints, being entirely of aluminium, do not suffer under these conditions, and this method is being more extensively used now that satisfactory welded joints can be made by means of portable oxy-acetylene blowpipe equipments.

It had long been recognized that this was the most hopeful direction in which to experiment, because such joints, containing as they do nothing but aluminium, would be as free from electrolytic action as the metal itself, but the difficulty met with was in getting rid of the film of oxide, which prevented the two surfaces uniting properly. In the case of the butt welding of small rods and wires, this difficulty can be easily overcome by applying end pressure at the moment of fusion to drive out the film of oxide, but in the case of sheets and plates this method is not practicable, and recourse had to be made to some other method. Lately several fluxes have been put on the market capable of dissolving the film of oxide and permitting the metal to flow together with perfect ease. Another method of welding aluminium sheeting which shows promise of success, and which would repay further investigation, is the electric system of welding, by means of so-called spot welders; this method being extensively used for copper and iron sheet. The electric welders as used for copper and iron wire are also suitable for aluminium wire with certain modifications.

Applications.

Iron and Steel Works.—Aluminium is used in iron and steel works, for removing the oxygen from the oxides of iron, and many other substances, with which it comes in contact, the heat generated by this reaction being so great that it may be also of service in raising the temperature of large bodies of iron.

The efficacy of small quantities of aluminium in preventing "porosity" is also very marked. Porosity is due to the partial disengagement of gases absorbed during melting, which are imprisoned as the metal cools. Aluminium appears to have the property of combining chemically with these gases and producing an innocuous slag.

It frequently arises in small works that a casting requires two "blows" of the cupola. In this case the difficulty of keeping the first tapping hot while the second charge is running down may be readily overcome by adding from time to time small quantities of aluminium to the metal in the ladle. The rise in temperature obtained effectually prevents the metal from excessive cooling.

For the purpose described, the metal may be employed in various forms. An alloy known as ferro-aluminium, consisting of about 90 per cent. of iron and 10 per cent. of aluminium, is used by many iron and steel founders, this material being so brittle that it is a simple matter for the user to break off the right amount to suit his own requirements. The use of ferro-aluminium has, however, been largely superseded by that of the pure metal, which is generally supplied in the form of notched bars and half-round bars, easily cut up into small pieces for use.

Some steelmakers use aluminium in a form known as "granulated." This consists of a powder which may vary in coarseness from that of rice down to that of sifted sugar. Where the heating effect of the burning metal is alone required granulated aluminium may be profitably used, and is generally mixed with sufficient smith-scale to provide the oxygen necessary for its combustion.

The makers also supply iron and steel founders with aluminium in small uniform pieces weighing exactly ⅛ oz. and ¼ oz. each respectively, so that the user is saved all trouble of weighing, and can add any predetermined percentage of aluminium to his iron or steel with a minium of delay and inconvenience.

A further application of this principle has been made in the "Thermit" welding process invented by Dr. Goldschmidt, where the heat of combustion of aluminium and oxygen is made use of to raise the temperature of iron and steel castings, etc., to the welding point.

Aluminium Castings, etc.

Aluminium is used for many purposes in the building of motor cars, where stiffness combined with lightness is desired. Among these may be mentioned crank-cases, gear-boxes, carburettors, radiators, and dash-boards, besides many small details, such as control levers, lubricators, etc., and it is, besides, finding a large and increasing outlet with engineers, brass-founders, and others, for a variety of general castings.

For castings, it is found of advantage to alloy the metal with copper, zinc, or nickel, which increases the strength and makes it easier to work, without materially increasing the weight.

Sheet Aluminium.

When rolled into sheet, the uses of aluminium are too numerous to mention, as the light metal is every day finding its way into new channels in competition with older metals. The reason for this will be easily seen when it is remembered that at to-day's prices a rolled sheet 6 ft. by 3 ft. by 1-16 in. thick, having an area of 18 square feet in—

Aluminium	weighs	16	lbs.	and at	1s.	1d.	per lb.	costs	17s. 4d.
Brass	"	49½	lbs.	"	0s.	6½d.	"	"	26s. 10d.
Copper	"	52	lbs.	"	0s.	7½d.	"	"	33s. 7d.
German silver	"	50	lbs.	"	1s.	2d.	"	"	58s. 4d.
Pure tin	"	42½	lbs.	"	1s.	5d.	"	"	59s. 10d.

Other thicknesses of sheets, tubes, rods, beadings, mouldings, angles, channels and other sections will, of course, be in similar proportion.

In the early days of aluminium, sheets composed of copper alloys were used to some extent in connection with shipbuilding. It has, however, since been demonstrated that for all such work only pure aluminium of the best quality should be used, and there is little doubt that naval constructors will find pure aluminium sheets, channels, mouldings, rivets, etc., of great assistance in partitions, ceilings, deck and chart houses, and similar portions of large ships, above the water line, where reduction of top weight is of importance in connection with the stability of the vessel. In 1901 a quantity of large aluminium plates was used in the chart house of the steamship Celtic, and the owners report that the condition of the material is satisfactory.

Aluminium Tubes.

Large quantities of specially pure aluminium tubes are being used for various purposes in connection with acid work, under which condition the pure metal re-

mains practically unaffected. In order to demonstrate the usefulness of aluminium tubes for steam coils, etc., some tests were made at Milton Works some time ago with the following results:—

Length of tube. in.	Gauge.	O/s diameter in.	Tested to lbs. per sq. in.	Remarks.
12	10	3¼	1,200	Expanded to 1-32 in. in middle but returned to original size on release of pressure.
12	12	2 11-16	1,200	Ditto (barely 1-32 in.).
12	14	2	1,200	As above, with rather less expansion.
12	14	1⅛	1,200	Perfect. Would probably stand considerably more.
12	19	1⅛	1,200	Ditto.

All the above were afterwards tested at 100 lbs. per square inch for half an hour, with the exception of the second on the list, which was under the steam test for 12 hours without apparent injury. This tube was, after the steam test, subjected to a second test of 1,200 lbs. hydraulic pressure without showing any signs whatever of fracture.

Electrical Industry.

As a conductor of electric current aluminium has a large and increasing field of usefulness, the difficulties at first met with in regard to jointing, etc., having now been overcome. The saving that can be effected by using aluminium in place of copper for overhead conductors is so large that in countries where long overhead transmission lines are in vogue the lighter metal practically reigns supreme. In this country there has not been up to the present the same opportunities for long distance bar overhead transmission lines, but during the past few years there have been erected many short distance aluminium lines for lighting and power requirements in connection with works, collieries, etc. With the increasing use of electricity for motive power purposes, aluminium conductors are being adopted much more extensively in such directions, engineers and consumers alike appreciating the immense saving in capital outlay secured thereby. Further, at the present low price of aluminium, the saving in cost of the bare conductor is so large that there is an extensive field for the metal for insulated underground cables, even taking into account the increased amount of insulation necessary for the somewhat larger cable.

Aluminium as used for electrical purposes has a conductivity equal to about 61 per cent. of that of pure electrolytic copper, so that to obtain the same conductivity it is necessary to increase the sectional area by 64 per cent. above that of copper, corresponding to an increase in diameter of 28 per cent. for a round conductor. Copper being 3.3 times heavier than aluminium, we see that the somewhat larger aluminium conductor will still weigh less than half of the equivalent copper conductor, the larger cooling surface of the aluminium conductor being a further factor in its favor.

For bus-bars and back connections in switchboards aluminium is also finding an increasing use, the saving in weight allowing of lighter supports and framework, which means additional economy over and above the saving in cost of the conductor. For the front of switchboards, aluminium is also eminently suitable for such fittings as bolts, lamp-holders, instrument cases, etc., the effect against a dark marble board being very pleasing.

There are several satisfactory methods of jointing aluminium conductors, according to the conditions under which it is called upon to work.

For small diameter wires as used for making up into cable the usual butt welded joint is made either in the flame of a blowpipe or by means of the electric welders as used for copper.

For bare stranded cables the usual method is to weld the two ends together by pouring molten aluminium into a cigar-shaped mould, previously clamped around the joint, but where high tensile strength is required a mechanical joint may be used, so designed as to give a wedging action when pulling tight in order to ensure good electrical contact.

For insulated underground cables it is not always practicable, to use welded joints on account of the confined space when working in closed boxes, and in this case either a mechanical or a soldered joint may be used, where the joint is afterwards protected from atmospheric influence. The simplest method is to slip a tube over the two ends of the cable with a slot through which the solder can run. The resistance of such joints is somewhat higher than in the case of welded joints, but they compare very favorably with copper joints made on the same principle.

The tensile strength of hard drawn aluminium wire is equal to about half that of a copper wire of equal section, but allowing for the increased size of an aluminium conductor to obtain the same conductivity as for copper, this figure is raised to about 75 per cent., the difference being more than compensated for by the decreased weight of the aluminium cable.

Alloys of Aluminium.

The alloys of aluminium in common use are confined almost exclusively to combinations of the metal with zinc, copper, and nickel. In general, the proportions of these metals which can with advantage be added to the light metal, do not largely exceed 20 per cent. in the case of zinc, 6 per cent. in the case of copper, and 5 per cent. in the case of nickel. A very interesting and valuable—especially for marine work—series of alloys, known under the name of aluminium bronzes, is also produced by the addition of aluminium in quantities up to 10 per cent. to electrolytic copper.

Salt is purified by melting in the new and rapid English process. The crude rock-salt is fed automatically to a table contained in a large furnace, is then fused, and runs into troughs, from which it is drawn at one side of the furnace into large caldrons. Air is forced into the molten mass, and lime is added. The impurities sink to the bottom, and the upper portion is ground and screened, while the lower part is used for chemical manure.

In the novel tool-tempering apparatus of W. Rosenhain, as exhibited at a soiree of the London Royal Society, the metal is heated in a vacuum tube, and at the required temperature shown by a thermo-electric indicator—is quenched by admitting water. The new silica tubes admit of sudden cooling from redness or greater heat.

Lead-wool consists of pure lead cut into fine strips by machinery, and is put up in pound skeins of yard-long threads. For making tight joints it is simply laid in the joint socket and pounded in with a caulking tool. It welds into a solid mass, filling every interstice, and it ensures more thorough work than results from using molten lead.

COBALT COMMENTS

By Alex. Grey

Nova Scotia Co. Prospects.—Statements contained in the annual reports of the consulting engineer and the secretary-treasurer of the Nova Scotia Silver-Cobalt Mining Co. offer commingled consolation and qualified promises of dividends, of which shareholders were beginning to wonder if l'appetit vient en mangeant. The company concerned is exceptional in that its mining area is in the Keewatin. It is capitalized at $2,000,000, all issued, and valued in the market at about $1,200,000. The character of the directorate and technical control is a guarantee that what there is will out, and it is urged that they are doing their utmost under stress to "make a satisfactory showing in the shape of dividends to the shareholders." As they are among the most representative mining capitalists engaged in the Northern Ontario fields, with many "irons in the fire," as they have not been identified with hurdle-racing markets, there is a measure of justification for the complaint registered by Mr. Benjamin B. Lawrence that "many stockholders fail to appreciate that it is impossible to do two things at the same time, namely, open up a property as this has been opened up, and make substantial earnings while you are doing it."

The mine that pays for its own development is the exception. Cobalt's mines have done it in greater degree than those of any other camp, because their virtues were naturally necessitous. They had to provide their own working capital, pay brokerage charges, meet vendor considerations. Owing to the Nova Scotia being so well groomed those who fancied the stable's choice should not be impatient; yet the situation seems to call for exchange of views rather than censure on either hand. The issued capital constitutes a liability to meet which reliance is placed in owned and leased ground adjoining and under Peterson Lake. Elsewhere 1,100 feet of driving and 500 feet of cross-cutting in the Keewatin "were unsuccessful in finding any regular or permanent ore chute. Some very rich ore was mined in various portions of the property, but the occurrence was mostly in small pockets, which although rich in silver, failed to yield any substantial quantity."

So writes Mr. Lawrence and nothing could be more to the point. A cross-cut disclosed what is particularized as "the pay chute" and as the Nova Scotia had only 40 feet of it, thirty acres were leased for 10 years from the Peterson Lake Company. The vein has since been followed for 200 feet; there is about 50 feet of "backs," and the values occur "as native silver scattered through the vein filling for a width varying from 5 to 10 feet." A winze proved the ore body to a further depth of 25 feet "in the Peterson Lake ground," and it is the opinion of Mr. Lawrence that "within 60 days we should have sufficient ore exposed to warrant our producing ore in quantity, say from 30 to 40 tons a day, which should yield a handsome return."

So far as these representations go, they reflect the thoroughness with which explorations have been prosecuted. They are insufficient for the speculative position, and those who grumble at this have only themselves to blame. Capital liabilities as against ore disclosed is somewhat Cobaltesque, but the $75,000 spent upon plant, the "two working shafts and some 1,900 feet of development in drifting, cross-cutting, sinking and raising," and the lease of adjoining territory known to contain the extension of "the pay chute," must suffice for speculative coteries who rarely take into account the idiosyncracies of "the vein calcite." However, during the twelvemonth ending August 31, 149 tons averaged $765.10 per ton or $114,000 in the gross. In August, 28 tons shipped averaging $603.57, or $16,900 in the gross, permitted a profit of $8,000 after paying working costs of $8,978. This is at the rate of 4.80 per cent on capital and if tonnage to be developed broadens this dividend aspect, there is the added assurance from Mr. Lawrence that "concentration" of the ores "inasmuch as the values are scattered through substantial widths, requiring the handling of a heavy tonnage," will be superseded by a process capable of "a large tonnage." Mr. Lawrence is "happy to say that it now looks as if" the separation "problem would be solved" to the "entire satisfaction" of shareholders. Taken in connection with the statement of Mr. Jacobs that the Nova Scotia management "will undoubtedly handle a very much larger quantity of material than is generally the case of Cobalt," the practical process evolved by Mr. Lawrence will be a welcome demonstration. It and the developments of another year should prove the perseverance or otherwise of the Nova Scotia ore bodies. If the section is inadequate the directorate are strong enough to find something that will be all-sufficient to obviate permanent disappointment. Meanwhile there is difficulty in subscribing to the pronouncement in the Unted States Investor of October 1 that "it is estimated by well-posted mining men that upwards of $1,000,000 worth of good ore is blocked out."

McNicol and Pickens, miners of Butte, established a world's record for rock drilling by driving a hole 56 5-8 inches, 7-8 inch bits, into a solid block of granite in 15 minutes at the Spokane Interstate Fair competition. The performance, which was witnessed by 20,000 men, women and children, netted them $750. McNicol weighs 215 pounds, while his partner is 15 pounds lighter. They used 20-pound sledges. One of the features of their work was the dexterity displayed in changing drills, this being done without missing a single stroke. The best previous record was 55 inches, drilled by Bradley and Frathey, of Spokane, five years ago. Other teams in the contest this year were: McGilvray and Erickson, of Silverton, B.C., 52 7-8 inches; Naylor and Anderson, of Burke, Idaho, 43 3-4 inches, and Johnston and Dunn, of Silverton, B.C., 43 1-8 inches.

For slow-speed pumps in the Rand mines, South Africa, a novel fly-wheel has been adopted. High freight rates make iron and steel machinery very costly, and the use of concrete rims for the fly-wheels of ten pumps is stated to have realized a saving of about $10,000. The fly-wheels are driven by electric motors through worm gear about 20 revolutions per minute. Each wheel is 14 feet in diameter, with cast iron bosses in which sixteen spokes of four-inch tube are screwed, and the rim has a base and an outside of ¼-inch sheet iron strips, separated by distance pieces. The strips are bolted together, the concrete rim between being 13 inches wide and 13 inches deep, strengthened by four ¼-inch wires interlaced with the distance pieces. The weight of the wheel is 8,000 pounds, and that of the rim 6,000 pounds.

CORRESPONDENCE.

Editor Canadian Mining Journal, Toronto:

Dear Sir,—I have read with a great deal of interest the paper by Mr. O. N. Skelton on "The Taxation of the Mineral Resources in Canada." I have probably had a better opportunity tha nanyone else of studying this matter during the last year, but do not consider it proper for me to enter on a discussion of any of the principles or subjects which are contentious, and I shall therefore merely qualify some of the statements made about the working of the Act taxing the mineral resources in Ontario, which are misleading without some explanation. In the first place, the results for the year 1907 (the year the Act came in force) are obscured by the fact that there was at first no limitation of the amount which might be deducted from the provincial tax by the municipalities for income tax, the Act having been amended in that respect since. There is no definite basis in the Municipal Assessment Act for determining what the income of a mine is, whereas the mode of computing the provincial tax is very specific and clear. Moreover, the municipalities claimed the right to assess the estimated income for the current year, whereas the provincial tax is based on results of the preceding year. It was therefore inevitable that the two assessments should clash and make the results very erratic.

The amount given as collected under the Supplementary Revenue Act is taken from the Provincial Treasurer's statement, which was for the calendar year of 1907. As the tax was not due until the first of December, 1907, a great deal of it—fully one-half, in fact—was not paid until 1908, and does not appear in the statement at all. In the same way the statement for 1908 will be too large, as it will include these taxes for 1908, which will probably be paid in before the end of the year, the tax now being payable on October 1st. A statement which is complete, except so far as acreage tax is concerned, will appear in the Report of the Bureau of Mines. It is impossible even at the present time to say what the actual amount of the acreage tax paid for the year 1907 will be, as payments are coming in almost daily for 1907 and 1908.

Further on the statement is made that 300,000 acres were forfeited in Ontario for non-payment of the tax of one cent per acre in the year 1906. As a matter of fact the time limit when forfeiture can take place under the old one cent tax has not yet arrived, and there is still over a year to run before anything can be forfeited under the two cent tax. The slaughter will probably be immense when the time limit for the present two cent tax expires and forfeiture takes place. The 300,000 acres referred to were cancelld for non-payment of rentals, which is, of course, an entirely different thing.

The suggestion that acreage taxes should be grauated, being low for the first few years after acquisition and changing from year to year, appears to me most impracticable, judging from my experience of the difficulty of distributing the information among the thousands of holders of mining lands that a tax of two cents per acre was due. A tax changing from year to year would entail endless work and consequently a great deal of expense, and would only exasperate the owners of mining lands. It must be borne in mind that the amounts are usually small, and the holders scattered far and wide, and therefore whatever tax is levied should be as simple as possible, and should not be constantly changed.

The tax on natural gas is considered in the paper as virtually an export tax. It is a great deal more than that, as it has proved a most efficient means of preventing the waste of natural gas by operators who are indifferent about gas, but are seeking oil. This waste destroyed incredible quanties of gas in the old Essex field, and contributed probably mainly to its rapid depletion, and was going on at an alarming rate in other fields in Ontario when the Act came in force.

Yours truly,

G. R. MICKLE.

Toronto, November 16th, 1908.

Editor of the Canadian Mining Journal:

Sir,—I enjoyed your Calgary effusion very much. Some one, though, gave you the wrong "steer" about it. The fact is, that I am the only one who knows exactly what transpired; fear deprived the others of their powers of observation, i.e., our secretary in his description talks about the "steers being led out of the corral." I have modestly but peremptorily "to resign that proud eminence" as the hero of the occasion—in favor of our worthy President. I was standing near him when the steer charged. Did he, panic-stricken, impale himself on the barbs of a wire fence or climb a post? His hungry eyes—as did forty other pairs—swept the far-flung vista, but no St. Charles oak spread forth its beneficent branches anywhere over that treeless plain. Whether, like the British man-of-war in the harbor of Apia, Samoa, which headed for the open sea when the other battleships, vainly attempting to anchor, were dashed to pieces on the rocks, he preferred the open plain, eagerly longing to pit his agility against the steer's; or whether, that acuteness of observation in the field which is at once the envy and despair of his geological colleagues, enabled him to espy the telegraph pole, will probably never be known. Suffice it, he hurled himself across the intervening space like a mountain torrent in the spring or Frank Law after a servant girl's savings. Did he look behind him? He disdained to, and besides there was no time for it. The goal was reached, the race was won, and all records broken. The time for the hundred dash is only an official record in sporting circles. We of the Institute can boast of having a President who has covered the hundred yards faster than any man the world has ever seen.

In regard to our Secretary, his grey molecules were gyrating at such a terrific rate that he thought the steers were being led out of the corral on a string.

Yours for truth,

THE MAN FROM COBALT.

Cobalt Ont., Nov. 13, 1908.

The Pulsometer Engineering Company, Ltd., Reading, England, were awarded a gold medal by the International Jury of the Franco-British Exhibition. The medal was awarded for their exhibit of a new patent Desicating and steam air pump, the invention of Mr. H. A. Fleuss, who is also the inventor of the celebrated "Geryk" vacuum pump, to which a silver medal was awarded at the St. Louis Exposition in 1904.

BOOK REVIEW

A Manual of Underground Surveying.. By Loyal Wingate Trumbull, M.E. Illustrated. 251 pages. $3 postpaid.. The Hill Publishing Company, 505 Pearl Street, New York, 1908..

The practice of mine surveying, like assaying, has in America developed characteristics that distinguish it from British and European practice. Mr. Bennet Brough's text-book, excellent as it is acknowledged to be, is more especially adapted to the requirements of mining engineers in Great Britain than in this country.

Mr. Trumbull's volume is the first attempt to embody in one volume the best features of American mine surveying. It is a careful compilation of material selected from magazines, technical publications, and catalogues. To this material are added descriptions of methods actually in use in many important mines. These have been contributed at Mr. Trumbull's request, and it has been his object to select only the most approved methods.

A knowledge of plane surveying is presupposed. Neither the theory nor the methods of ordinary surveying are touched upon.

Copious bibliographical notes are appended to several of the chapters. These should prove most instructive.

Chapter I., on instruments, includes a readable dissertation on the history of the transit. The chapter comprises 63 pages, and is clear and well illustrated.

Then follow chapters on "Meridian," "Underground Practice," "Carrying the Meridian Underground," "Survey of Secondary Openings," "Record of Survey," "Uses of the Mine Maps," "Making the Map," "Map Filing," "Bore-Hole Surveys," "Methods of Various Engineers." The last chapter gives the United States Deputy Mineral Surveyor's examination. A good index completes the volume.

In glancing through this manual, we have been impressed with the practical tone that pervades each chapter. It is pleasant to notice that such subjects as sampling, assay-maps, bore-hole surveys, waterproofing maps and blue-prints, are not neglected. Indeed the book is thoroughly modern, practical, and well-arranged. The most critical can ask for no more than this.

The Journal of the Canadian Mining Institute, 1908. Edited by the Secretary. Volume XI. 616 pages. Illustrated. Published by authority of the Council at the Secretary's Office, 413 Dorchester Street W., Montreal, August, 1908.

As an annual record of the work and growth of the Canadian Mining Institute, and as a permanent source of reference on many mining and metallurgical subjects this volume is considerably more significant than its predecessors.

In all there are forty-one papers, which may be grouped roughly into those dealing with the geology and metallurgy of Canadian iron ores; those dealing with fuels; one on graphite; one on gold; six describing the geology, mining, concentrating, and metallurgy of Cobalt silver ores; seven touching on the ores and mines of British Columbia. In addition there are nine papers on miscellaneous subjects, and four excellent descriptive papers contributed by students.

The general index, compiled by Mr. F. Nicolas, of Ottawa, is the work of a finished index-maker.

It will be seen that the range of subjects covered is wide. Not only is this the case, but nearly every paper is of a high degree of excellence.

The editor, Mr. H. Mortimer Lamb, is to be felicitated upon the contents and appearance of Volume XI. Clear type, good paper, excellent half-tones and diagrams, along with careful editing, are features to be commended.

China-Clay: Its Nature and Origin.

In the Transactions of the Manchester Geological and Mining Society, Vol. XXX., Part XX., there appears an exhaustive article on the nature and origin of china-clay, by Mr. George Heckling, B.Sc.

"Kaolin," or china-clay, is prepared by directing on to the "rock" (decomposed granite) in the quarry a head of water, which sweeps the material away to a series of catch-pits. In these pools the suspended material settles, the coarsest particles in the first, the finer material in the next, until the last poor gets only the finest mud. This last, when dried, is the best china-clay, and appears to the eye perfectly homogeneous. But both coarse and fine materials are composed of varying proportions of quartz, mica, kaolinite, and tourmaline. In the coarse settlings quartz greatly predominates, while tourmaline, biotite, and white mica make up the remaining material. In the finer material quartz and tourmaline diminish, while mica increases and soon preponderates. In the very finest claps, kaolinite and white mica make up 90 per cent. of the total, and quartz almost the whole of the remaining 10 per cent., tourmaline forming 1 per cent. or less. This composition is usual in good clays.

China-clay-rock is the result of the complete weathering of igneous masses in situ. Most common sediments are probably the result of less complete weathering, in which the material is removed so soon as decomposition has proceeded far enough to set it loose.

Asbestos wood, which seems to be attracting attention as a new structural material, is made chiefly from asbestos fiber, and is about two-thirds as strong as ordinary wood and takes a higher polish. It is as easily worked as oak and maple, while nails hold in it better. The material is now usually made in sheets three by four feet in size, and is adapted for roofing and walls, but it can be panelled for wainscoting or doors, or moulded into ornamental trimmings.

A novel device for measuring the hardness of metals is called the scleroscope by Albert F. Shore and Dr. Paul Herould, its inventors. A steel ball weighing 40 grains, made extremely hard by a special process, is enclosed in a glass tube, and the hardness is indicated by the reboudn as the ball is dropped on the metal under test. A scale measures the height of rebound. On this scale 100 is the average hardness for carbon steel, and proves to be the safety limit for steel tools after reheating and tempering. The instrument is valuable in making tools of standard hardness.

EXCHANGES.

The Engineering and Mining Journal, November 14, 1908.—Mr. John A. Church, writing on "The Principles of Machine Sampling," predicts a largely extended use of sampling machines in the close future. "At present," says Mr. Church, "the work done is so irregular that I feel it is high time the whole engineering profession should . . . determine what can be done to improve the work." The closely guarded results of tests from one establishment cannot do anything like the good that will be derived from a series of comparative resamplings from every mill in the country.

On copper ores containing 2, 3, and 4 per cent. copper a campling variation of 5 lb. metal per ton of ore should be made before reaching the sample grinder.

Mining World, November 14, 1908.—The first installment of a paper on the Coeur d'Alene mining district, Idaho, by Dr. J. P. Rowe, appears in this number.

The principal producing portion of the district is wholly within Shoshone County. The axis of the Coeur d'Alene Mountains borders the district on the east, and nearly all the present profitable mining is done on the western slope of the Coeur d'Alene Mountains and on the north side of the south fork of the Coeur d'Alene River. The district east and west extends 20 miles north and 11½ miles. The producing territory is being constantly added to. Good roads, plentiful water, and good railroad service are features of the district.

Many of the best producing mines are worked to a depth of 2,000 feet by the tunnel method. Gravity alone is used for draining many of the mines and for handling the ore, although in the longer tunnels electric power is installed.

A prospector named Thomas Irwin located a quartz claim near the Mullan road, a few miles east of Kellogg, in 1878. Next year the famous Prichard Creek was discovered. Three years later placer gold was found on Prichard, and many claims, including the Widow, were staked. The year 1884 saw a general gold-seekers' rush. In a few months the town of Eagle sprang into being, trails were made to the Northern Pacific Railroad, and telegraphic communication was established. Later, the town of Murray became the centre of placer mining. Near it were the rich Widow, Gillette, and Myrtle claims.

In 1884 the town of Wallace (then known as Placer Centre) was founded, and some of the best silver-lead mines of the south side were located, including the Gold Hunter, the Helena-Frisco, and part of the Hecla. The next year witnessed the discovery of the famous Bunker Hill and Sullivan mines. From early in 1886 crowds from Murray and other outside towns flocked to the lead-silver district, especially to the country around Warden and Kellogg. The Bunker Hill and Sullivan ore was at that time hauled by wagons, boat, and rail to Helena, Mont.

In 1890 the beach gravels near Murray were worked vigorously. Narrow gauge and standard gauge lines had now entered the camps, and the larger mines operated their own concentrators. During the period 1892-4 most of the mines were closed on account of labor troubles and high freight rates. In 1898 many mines were consolidated by the Federal Mining and Smelting Company. The Hercules mine showed up rich ore in 1901, and made millionaires of several of the heaviest stockholders.

The Snowstorm copper mine was developed in 1903. Since then the district has grown steadily.

Mining Science, November 12, 1908.—An article of a series dscribing the Boston Consolidated Company's concentrating plant appears in this issue. The plant is situated at Garfield, Utah. Nissen individual-mortar stamps, installed in batteries of 4 weighing 1,500 lb., 6-inch drop, 106 to the minute, discharge through 26-mesh screens. The ore is crushed to ½ mm. particles before it passes the screens. The pulp is run into four 3-compartment spitzkasten, the overflow from the last compartment going to 12 Callow tanks. The concentrating equipment consists of two rows, 11 in each row, of No. 5 Wilfley tables, set head to head, receiving classiged feed; 12 Callow tanks, one No. 5 Wilfley table, and 17 Johnston suspended vanners complete the equipment.

PERSONAL AND GENERAL.

Mr. John E. Hardman has returned to Montreal after a prolonged absence on business connected with Canada Iron Corporation, Limited.

Mr. A. A. Cole, mining engineer to the T. & N. O. Commission, has thoroughly recovered from his recent illness.

Mr. A. P. Scott has resigned the position of chief chemist for the Dominion Iron & Steel Company, Sydney, N.S., to accept an appointment as metallurgist to the General Electric Company at Schenectady, N.Y. Mr. Scott did brilliant work in connection with Steel vs. Coal lawsuit.

Mr. G. H. Gillespie, now of Madoc, Ont., has returned from New York.

Dr. W. G. Miller, president of the Canadian Mining Institute, has been nominated by the Montreal branch as president for the year beginning March, 1909.

It is reported that Mr. James Gayley, first vice-president of the U. S. Steel Corporation, has tendered his resignation of that position, and that he will be succeeded by an officer of the Carnegie Steel Company. Ill-health is the cause of Mr. Gayley's resignation.

Mr. J. Parke Channing has been elected a director of the Kerr Lake Mining Co., in place of Mr. J. A. Jacobs.

Announcement is made that a law partnership has been formed between Mr. Edwin W. Kearney, of Haileybury, and Mr. E. Ainslie Wright, B.A., of Renfrew, to succeed to the practice of the late Harvey D. Graham. The new firm will be known as Graham, Kearney & Wright, and will continue to carry on a general law practice with permanent offices in the Graham-Hennessy Block, Haileybury, Ont.

Mr. H. Gardner, of London, Eng., one of the largest shareholders in the Granby Company, was a visitor in Phoenix for a couple of days last week, being shown through the mines by Manager A. B. W. Hodges. Mr. Gardner is in charge of the London office of the American Metal Co., which handles a large amount of Granby copper, Mr. Jacob Longcloth being president of both it and the Granby Company. Mr. Gardner is also largely interested in Montana and California mining, and is combining business with pleasure in a tour of the properties. He is accompanied by Mrs. Gardner.

Mr. Frederic Keffer, consulting engineer of the B. C. Copper Co., with a staff of assistants, was engaged for ten days this month making a complete examination of the Rawhide and Brooklyn mines of the Dominion

Copper Company. The examination has been most exhaustive, and samples for assaying have been taken from every lead in each of the properties. Previous to commencing the work here the Sunset mine, in Deadwood camp, and the Mountain Rose, in Summit camp, were thoroughly examined, so that in concluding the investigation at the Rawhide and Brooklyn Mr. Keffer was able to compile a detailed report on the Dominion Company's mines.

Notice has been given that after November 1st, 1908, the headquarters of the Canadian Mining Institute and the library of the Institute will be Rooms 3 and 4, Windsor Hotel, Montreal.

The fragility of incandescent gas mantles is a serious drawback to their use, but a more durable fabric seems to have resulted at last from the experiments of German chemists. The mantles now so familiar have a tissue of cotton or ramie on which oxides of thorium and cerium have been precipitated. Attempts to use other natural fibers have failed, and the successful new material is an artificial silk made by dissolving cellulose in ammoniate of copper. This silk mantle takes up thorium nitrate, which ammonia changes in the fiber to hydroxide of thorium. The thorium silk does not absorb moisture like the old mantles, and it has many times as great resistance to shock.

Powdered sulphur mixed with oil is claimed to have frequently relieved hot bearings in steamship machinery, but a lubricant much stronger still is sulphuric acid. On one occasion, after repeated trouble from heating, the dilute acid was allowed to drip slowly upon the working bearing. In half an hour the part was cooled, when the acid was washed out, and the ordinary oil was applied. The cure was permanent.

Slag Cement.—A material equal to the best Portland cement is now claimed from blast-furnace slag as a product of the Cowper-Coles process. The slag is taken while still molten and raised to greater heat by means of an electric resistance furnace, the necessary amount of chalk being added, and then certain reactions are brought about by electrolysis. High-grade cement is thus obtained at very low cost.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, Nov. 20.—St. Lawrence Shipments.—With this week the 1908 season closes for the St. Lawrence. Notwithstanding all the difficulties that have been met with from forest fires and fog, the start obtained through the early opening of navigation has been maintained, and shipments will be in excess of any previous season. The Dominion Coal Company's shipments will total 1,340,000 tons, which is about 225,000 tons greater than last year.

Steel-Coal.—At the time of writing, it is supposed that the Steel-Coal appeal is being heard before the Privy Council in London. Before this issue of the Journal appears it is possible that we may know the result of this protracted legislation. The Montreal Star humorously states that the latest news from London is that Mr. James Ross says, "We will win," and Mr. Plummer says, "We will win." If these gentlemen made the remarks attributed to them, their grammar must have fallen on evil times.

U. M. F. A. vs. P. W. A.—Mr. John Moffatt, the Grand Secretary of the P. W. A., has been committed to the Supreme Court on a charge of perjury, at the instance of the partisans of U. M. F. A. in this neighborhood. The charge appears to be one of technical inaccuracy in an affidavit made by Mr. Moffatt in connection with the injunction which the U. M. F. A. obtained against the officers of the Grand Council. The trial is to take place on the 26th November, this date having been fixed in order that the Court might be acquainted with the judgment of the Supreme Court in the matter of the appeal of the U. M. W. A. against Judge Drysdale's dissolution of the injunction referred to. The full bench in Halifax unanimously dismissed the appeal. A large portion of the evidence in the perjury charge is identical with the evidence given in the appeal against the dissolution of the injunction.

From the rather mixed explanation just given it will be seen that a good deal of litigation is going on between laborites down here. It may eventually dawn upon the members of the miners' unions that paying lawyers is an expensive game, to which, like the making of books, there is no end. It looks as though the U. M. W. A., having failed in their attempt to get hold of the defense fund of the P. W. A., are determined to wasate it in legal fees.

Elections and Trade.—The Halifax Herald is surprised that there should be a depression in the coal trade after Mr. E. M. Macdonald's promises before the elections, saying that this gentleman had claimed all credit for the prosperity of the coal trade in Pictou. That may be, but is it not a little ridiculous for any political party to claim credit for prosperity or to be blamed for the opposite state of affairs? Under the representative form of government that obtains in Canada, as in other parts of the British Empire, prosperity or otherwise is not a matter of governments. It is a matter of the application of the laws of supply and demand. At election times all kinds of promises and threats are exchanged, and the direst forebodings are mixed with the most roseate prophecies according as one's political sympathies may tend. Yet the steady development of the nation goes along unchecked. Canada has not prospered during this past decade because her government has been Liberal or Conservative. She has prospered because she has drawn nearer and nearer to the glorious destiny reserved for her, and no matter who had been in power, this period in her history could not have been delayed any longer. This is a cardinal principle of British institutions. No matter what the nature of the administration, in the end the policy of the country remains immutable. Around election times the opposing candidates revile each other, and the newspapers become reminiscent of the "Eatanswill Gazette." But, after all, the Government does not do anything foolish or ill-advised. That is why most people are amused rather than impressed by such vaporings as were indulged in by the Halifax Herald regarding Norwegian shipping and the desperate straits of the schooner captains. Should any responsible Cabinet be so foolish as to act on the Herald's advice and immediately and violently upset the principal industry of the province, the Herald would be the first to cry out, and the usual colored headlines would be in evidence.

The Herald is not the only sinner, for its bitter rival (on paper), the Halifax Chronicle, has just received a well-deserved slating from the P. W. A. lodges. This latter paper made some very uncalled-for remarks on the result of the Cape Breton elections, stating that the miners were ungrateful, and had "stabbed their best friends in the back." This was because the Liberal candidate was defeated. Now, what right has any member of Parliament to pose as a special friend of any section of his constituency? He is in Parliament to represent his constituency, not to obtain favors for them. The statements made by various members of Parliament that they have obtained such-and-such benefits for their constituents, such as a postoffice, a wharf, or other public conveniences, betray a perverted sense of political duties. It used to be understood that members of Parliament were sent to the legislature to make laws and decide the policy of the country, not to act as a sort of glorified parish council debating about the parish pump. It is a sad fact to admit, but somehow the byword, "to the victor belongs the spoils," is firmly fixed in our political ideals.

Rescue Apparatus.—With our friends in the United States, to think is often to act. It is not very long since the three foreign experts made their report on the conditions in American mines, and it is only a short time since the Government's Central Rescue Station was erected in Pittsburg. In the past month, however, three serious fires have been fought successfully by men wearing the Draeger apparatus. The fires occurred in the Greensburg No. 1 Mine of the Keystone Coal & Coke Co.; the Hazel Mine of the Pittsburgg-Buffalo Co., and in the No. 1 Mine of the Washington Coal & Coke Co. The fires in the Washington Company's mine and in the mine of the Pittsburgh-Buffalo Co. were fought by men from the Government station. Further details are not to hand, but evidently the Pittsburgh station has soon got down to real business.

NEW BRUNSWICK.

The Canada Iron Corporation has lately taken over extensive Vanadian iron foundries, together with mining interests of the Drummonds. Mr. J. J. Drummond, of the above-mentioned corporation, accompanied by Mr. W. F. C. Parsons, chief mining engineer at Londonderry, N.S., was in St. John on the 17th of November, and on the following day left for Fredericton to hold a conference with the Provincial Government relative to the construction of the railway which the company intends building from their Gloucester iron deposit to Bathurst, the length of the road to be about twenty-five miles, with 80-pound rails, and of the best construction. Mr. Drummond recently interviewed Mr. O. Turgeon, M.P., concerning improvements at the entrance of Bathurst harbour, and expressed a hope that the Government would undertake the necessary work.

Relative to the merger herein referred to, Mr. Drummond denied the statement that the Drumond interests had been sold to an English syndicate. Five of the old directors were on the Board of the new corporation, and four new English capitalists were added. The control remains in Canada.

The corporation's capital si $8,500,000, and would likely be increased to $10,000,000.

Among the concerns included in the merger, Mr. Drummond mentioned the following: The Londonderry Iron and Mining Company; the Canadian Iron and Foundries Company, with plant at Londonderry; The Annapolis Iron Mines; foundries at Three Rivers, Montreal, Hamilton, St. Thomas, and Wort William; Canadian Iron Furnace Co., including the Radnor Furnaces, P.Q.; the Midland Ontario Blast Furnaces; the Drummond Char coal Furnaces, and the Georgian Bay Engineering Works. The corporation had also an interest in the Bathurst properties, the Drummond Mines at Cobalt, and Bessemer Iron Mines in Hastings County, Ontario, and other mines.

Mr. Drummond states also that a number of men are at work at the Gloucester mines uncovering the ore, and it is hoped to be able to start on a much larger scale in the spring. Immediately proper facilities are provided, the company will begin to ship ore, and will in due time establish a blast furnace at the mines.

It has been learned that the Local Government will consider favorably the matter placed before Premier Hazen by Mr. Drummond.

A party of engineers is now at work on the preliminary survey, and in the event of the grants being obtained, the final survey will be made this winter. The mines will in all probability be opened up in the spring, and ore will likely be ready for shipment by the time the railway is completed.

Upon trade conditions depends the development of the mines, and should these prove satisfactory, ore wil in the course of time be smelted on the spot. It is not the intention that the business proceed like in the pulp industry, in which the raw material is being shipped away and outsiders allowed to reap the profits of manufacturing

Mr. G. W. Ganong, ex-M.P. for Charlotte County, is interested in a copper property near Springfield, on the New Brunswick Coal and Railway Company's line. A seam of copper eight feet wide, which can be treated at but little cost has been opened up. Associated with Mr. Ganong in the venture are two Colorado mining men. Work has been suspended until the spring.

ONTARIO.

Cobalt, Nov. 21.—A topic that is being discussed on the street corners is Professor Hidden's break about Crown Reserve. Prof. Hidden stated that a hose had been played on the face of the vein for obvious purposes. Mr. Cohen denies this. Some one in Montreal and some one else here put up money to prove that Hidden is wrong. The Crown Reserve people claim that nothing is hidden. Hidden claims that all things are Hidden. And so on.

Cobalt is to have a daily paper. The "Cobalt Nugget" is undertaking to appear every 24 hours.

The Chambers-Ferland has installed an air compressor purchased from the O'Brien mine. A contrast has been made with the American Smelting and Reduction Company of Denver for ore under 1,000 ounces; 250 feet of drifting is the amount done up to date at the 100-foot level.

Andrew Osman and John Aha, two Finlanders, were killed at the Beaver Mine on the evening of Monday, November 16th. While they were being lowered in the bucket the bucket tipped and both men were hurled to the bottom of the shaft. Both were killed instantly. A boy of seventeen years of age was running the hoist.

Montreal River.—During the latter part of October your correspondent left Latchford for Elk Lake city. The journey takes ten hours, and is broken by three portages, none of which exceeds half a mile. Pork Rapid portage, about a third of a mile long, has a tramway for freight. On the other two portages freight is hauled by cart or sleigh. At Pork Rapid is a good eating-house. The return journey took eight hours.

The boats were loaded with provisions and supplies. Little machinery was visible. Between Elk Lake City and its sister city, Smythe, on the west side of the lake, only 100 yards of water intervene. Both settlements are well situated. The townsites are so placed as to secure good drainage and plentiful water. There are four comfortable, well heated, clean hotels. The grub is as good as can be found in any such places, and considerably better served than usual.

At the time of your correspondent's visit the snow was eight inches deep on the level. Consequently it was difficult to see the country to advantage.

Several properties, including the Otisse and Downey, were visited. The Downey lies half way between Elk Lake City and Silver Lake. Silver Lake is six miles from Elk Lake City.

No real mining was being done. At the Downey 30 or 40 bags of silver ore have been taken out. At the Otisse a considerable amount of trenching has been done. But now all energies were directed to putting up bunk-houses for the winter. Most of the buildings gave indications of being very substantial.

The general impression formed by your correspondent was that there is no such thing as a mine in the district. In fact, development work is hardly properly in swing. It will take at least six months of continuous work to get beyond the first stages of development. Unprejudiced visitors will admit that what this and the rest of the Montreal district offers is a fine chance for putting some money into investigating the promising surface showings. But nowhere is there anything that should be or can honestly be called a mine.

Investors should see that every cent of their money goes towards finding out what the Montreal River veins mean.

BRITISH COLUMBIA.

Rossland.—Mining has been quiet but steady throughout this district for the past two weeks. Elections on both sides of the boundary line have withheld immediate action in several matters that were pending, but now that the vacant offices have been filled those behind the mining industry here can put their plans into operation, well knowing what political interests they will have to deal with for several years to come.

The operations at the big mines during the past fortnight were along the regular lines, and a steady output was maintained. The tunnel being driven by the Le Roi No. 2, Ltd., on the Surprise claim is being rapidly bored. In this adit a new record for driving has been made for the camp. Messrs. Sexton, Swanson, Piper, and Jacobson, who have the work in hand, beginning October 5th reached the 180-foot mark on November 5th. They used one machine drill, working two shifts, and did their own blasting, etc.

The Centre Star during the last couple of weeks has shipped 3,700 to 3,800 tons per week, the Le Roi 1,600 to 1,900 tons, and the Le Roi No. 2, Ltd., from 400 to 600 tons, making the average weekly shipments a little over 6,000 tons per week. The average shipments from the camp are heavier than they have been for some time.

Among the small mines, the St. Elmo and I. X. L. appear on the shipping list, 3 35ton car of select ore having been shipped from the St. Elma to the smelter and a 3-ton shipment from the I. X. L. A considerable quantity of gold-bearing ore was taken from the I. X. L. in the early days, but the main lead was lost, and although several lessees have spent time and money digging for it, they have received but little reward for their labor. The ore is of an altogether different formation from that found in the Le Roi and other mines, but a few paces away being a quartzite and carrying gold both in a free state and associated with a base metal. No one would be surprised any day to hear that some one who had leased either the I. X. L. or O. K. mines had opened a duplicate of the rich pockets encountered in these mines in the early days, for all are confident that the main ore body is still to be located in the heart of the O. K. mountain.

PHOENIX.—Nothing unusual has happened in this district for several weeks. In Dominion Copper affairs there is very little that is new, and it is not expected that any important movement will take place until the reorganization proceedings have been carried through.

The Granby mines, the Mother Lode, and Oro Denoro of the British Columbia Copper Co., and the Snowshoe and Phoenix Amalgamated of the Consolidated M. & S. Co., are the only properties shipping at present. District shipments are being maintained at 34,000 to 35,000 tons per week. For the week ending November 14th the shipments were: Granby, 20,037 tons; Mother Lode, 11,566; Oro Denoro, 950; Snowshoe, 2,800. Including these shipments, which amount to 35,353 tons, the output of the district totals up 1,239,292 tons.

Henry Bahrs and associates have taken up the option on the Golden Zone group recently dropped by men interested in the Daly Reduction Co. Mr. Bahrs is now in Boston working on this deal. The Golden Zone group comprises the Golden Zone, Irish Boy, British Columbia, and Silver Bell claims. The showing on these claims is much similar to the ore found on the Nickel Plate group, the ore carrying gold, silver, and some nickel and cobalt. The work so far done on the claims has been in a development way, and consists of open cuts, glory hole and two shafts 35 and 50 feet in depth. A five-stamp mill was but lately installed at the property, which may be used for mill tests at certain periods of the year. Just now this mill is not in operation, owing to scarcity of water.

Development on the Bruce mine is giving good results. There is a splendid showing of chalcopyrite on the property carrying gold in a paying quantity.

Nelson.—The wonderful water power that is available at Bonnington Falls, and which is destined to play an important part in the future of the mining industry of Southeastern British Columbia, is now making its might felt in this district, and the machinery at the Silver King and Queen Victoria mines will soon be operated by electrical energy from the power plants on the Kootenay River.

The West Kootenay Power & Light Co. is developing 30,000 horsepower in two plants at Bonnington Falls, which is distributed over heavy voltage lines to Trail, Rossland, Grand Forks, Phoenix, Greenwood, and Nelson.

The City of Nelson also has an up-to-date power plant situated above the plants of the West Kootenay Co., and in addition to lightin gthe City of Nelson are competing with the West Kootenay Co. for the business of the mines.

The Van-Roi Co. are planning to do 1,000 feet of tunnelling and development. Work will be begun in the near future.

Development at the Ymir mines is being prosecuted in the direction of the big lead that it is thought lies beyond the old vein and farther in than the short section of vein recently uncovered 800 feet northwest of the old workings. The discovery of large and small fragments of "float" above the hill from the old workings led to the hypothesis that a large vein existed in the unexplored ground above the mine, and work carried out along these lines has given most encouraging results. It is expected that a new and valuable ore body will be opened up before the work has progressed much farther. The 80-stamp mill is capable of handling a large tonnage of ore; in one year the company having crushed 69,505 tons, from which a profit was derived of $40,000. Further working costs are expected to appropriate $4 per ton.

Vancouver.—A new seam of good quality coking coal has been opened up in the Bulkley district, about five miles from Telkwa. This seam is forty feet thick.

The Iron Mask, the leading mine of Kamloops district, has been disposed of to Minnesota capitalists. This mine has not been working for a couple of years, on account, it is stated, of financial difficulties. The showing of ore in the mine is very favorable, and there is an up-to-date hoisting and air compressing plant on the property. Upon the Iron Mask, to a great extent, rests the future of copper mining in Kamloops district.

George Patterson, an old prospector from the Yukon, recently took up a homestead near Sedgewick, Alberta, and the prospecting fever being still strong within him, he dug around and found a big deposit of auriferous gravel on his place, assays from which gave from $6 to $30 per ton. It is supposed that the deposit is of glacial origin. There is considerable excitement over the find, but considerable work will have to be done before the true value of the discovery will be known.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax, N.S., Nov.10.—The transfer of the Drummond Iron Ore properties at Londonderry, Torbrook, and Bathurst to a wealthy English syndicate, headed by Sir James Heath, has been consummated, and very shortly the blast furnaces at Londonderry will be put in operation again to test the quality of the Bathurst ores. This is good news for Londonderry, and this section of Colchester, as the shutting down of the blast furnaces has caused general depression in the Colchester mining town and surrounding districts.

Sydney, Nov. 17.—It is reported that McKenzie & Mann are making an effort to purchase the Mabou coal mines at Inverness. These are conceded to be superior to any in Nova Scotia as to quality. The present owners are handicapped through lack of financial backing, and once this past summer were compelled to close the mine for a time, and at present it is only working on half time.

McKenzie & Mann own the Inverness Railway, which branches from the Intercolonial and runs past the Mabou deposits, and should they become purchasers, they could afford through superior shipping facilities to sell their product much cheaper than the present syndicate.

Halifax.—The Eastern Trust Co., receivers of the Boston Richardson Mining Co., have, as a result of the operation of the mine for the month of October, received a brick of gold weighing 579 ounces.

Halifax, Nov. 20.—With the sailing of the steamer Ocean from Sydney on Friday next the Dominion Coal Company's shipments up the St. Lawrence will discontinue for the season. The total quantity going in that direction this year was 1,345,000 tons, inclusive of a shipment of next Friday, an increase of about 200,000 tons over last season.

ONTARIO.

Craigmont.—Operations have been resumed at the plant of the Canada Corundum Company, at Craigmont, after a shut-down of some eleven months. The entire property of the Canada Corundum Company has been leased on a royalty basis to the Manufacturers' Corundum Company, Ltd., a corporation organized by Mr. D. A. Brebner, late secretary-treasurer of the Canada Corundum Company. The plant will for the present be run on a 12-hour shift, and with the improvement of business conditions in the United States a ready demand for the company's product is being met.

Cobalt.—During the month of October the La Rose Consolidated Mines shipped 17 cars of ore from their mine. Out of these cars five of them were high-grade, and the remainder were of a medium or lower grade. At the main La Rose mine a force of 170 men are engaged in active mining operations.

On the Violet property a force of ten men is engaged in surface prospecting. Several trenches have been dug, and up to date six well-defined veins have been caught. These will run from one to six inches in width of calcite. It is quite probable that a new shaft will be started on the property during the coming winter.

The only work being done at the University mine is the sinking of a new shaft. This shaft was sunk on three small veins, whose continued width made five inches, and the ore carries native silver. The shaft is down 45 feet, and will likely reach the 100-foot level before any drifts are driven on it. Only one machine is engaged in this work, and a force of twelve men are employed on the property.

During October the Nipissing Company mined ore of an estimated value of $121,445, and shipped ore of a nestimated value of $127,518.

The most important events of the month included the cutting of three cross veins on the 145-foot level of the Kendall; favorable prospecting developments in the diabase on R. L. 305 and R. L. 408; and the increased possibilities of cutting the La Rose vein at the Promise shaft, in view of recent developments by a neighboring company.

A recent trainload, consisting of about 600 tons of silver ore shipped from various parts of Cobalt, consigned to the American Smelting and Refining Company, Denver, Col., routed via T. & N. O. Railway to North Bay, Canadian Pacific Railway to St. Paul, in connection with the Chicago, Burlington & Quincy Railway, made the fastest time that has ever been accomplished on freight between these two points. The time occupied in transit was only four days and twenty-two and a half hours, this as against time via other routes of eight days.

ALBERTA.

Calgary, Alta., Nov. 18.—When the matter is taken up in earnest, it is believed a considerable supply of petroleum will be produced in Alberta.

From the American boundary on the south to Lake Athabasca, several hundred miles north of Edmonton, there are signs that the underlying rock is saturated with petroleum, while along the Athabasca River the deposits appear at or near the surface. Natural gas and oil pour out of the river banks and the bed of the stream for over 100 miles.

Near Pincher Creek some successful oil and gas well have been bored, and the Western Oil & Coal Consolidated, which has leased 13,000 acres of the most promising land surrounding that town, is now actively engaged in drilling for both oil and natural gas.

BRITISH COLUMBIA.

Kaslo.—At the Reco mine 4,000 sacks of ore are ready for shipment. As soon as rawhiding commences, shipments to the Trail smelter will be started.

Victoria.—The Daily Colonist says: "What ought to have a stimulating effect on mining affairs in this province is the announcement that Le Roi No. 2 mine, at Rossland, has declared another dividend, making a total of six shilling a share for 1908. This property is making an excellent showing, which is indicated by the fact that the shares have made a further advance in price on the London market, and the management is to be congratulated."

Nelson. Electric power from Bonnington Falls is being installed at the Silver King mine, nine miles from Nelson. Power is also to be installed at the Queen Victoria mine.

Nelson, Nov. 14.—While the principal feature in the mining in the Boundary is the pushing forward of the development work upon the Phoenix Amalgamated, belonging to the Consolidated Co. of Trail, where the owners expect confidently to have a mine equalling the Granby in point of capacity and while in Rossland there is steady prosecution of work upon the older properties and a good deal of leasing going forward in some of the lesser mines, in the Slocan the activity is still marked. Sandon is again resuming something of her old aspect with the prosperity derived from the working of the Whitewater and other mines. On Slocan Lake the Vancouver, while not shipping to any extent, is steadily developing. The site for the new mill there has been graded and preparations made for its erection in the spring. On Kootenay River a power line has been brought into the Queen Victoria mine where now nearly one hundred miners are employed and on the Granite nearly opposite the mill has recently been running some very good ore.

The alterations to the Bluebell mill have been completed and the mine is now in a position to maintain a large output. A new mill is being projected to work conjunctly the Mother Lode and Kootenay Belle, and a larger mill is being planned for the Nugget, while at the Queen in the early spring a

cyanide plant will be put in. In the meanwhile a two mile flume has just been completed, insuring the present plant against any lack of water. A power line 25 miles long is being surveyed to connect the Sheep Creek properties with the main line of the West Kootenay Power Company.

Kalso.—The Consolidated Mining and Smelting Company is reported to be after the Ivanhoe mine at Sandon. The Ivanhoe comprises a group of twenty-six claims, lying north of the Slocan Star. It shipped for years, but has been closed since 1905. The ore is composed of zinc-blende and galena.

Nelson.—With the beginning of winter on the higher slopes of the mountains properties which have been developing all summer are now beginning to ship under more advantageous conditions. While this is particularly true of the Slocan, other properties in Rossland and in the Boundary are also coming to the front as shippers.

The event of the week is the proving of a parallel lead on the Nugent mine on Sheep Creek. The Sheep Creek district hardly one year old and which has now an output of close on 700 tons weekly is negotiating for power to run its properties on a more economical basis.

In Rossland the Silver Belle mine, not shipping since 1896, is again to the front, while the I.X.L., an old Spokane proposition is again under lease. The Centre Star mine with a shipment of 4,677 tons for this week is a record, while the Trail smelter with its receipts of 9,953 tons has again established a record.

YUKON.

Vancouver, Nov. 7.—"Provided circumstances warrant we will next season complete construction of the spur from the main line into the mineral zone of the White Horse copper camp; seven miles, or half of this road, was built this summer." This statement was made by A. L. Berdoe, general manager of the White Pass and Yukon route.

"This season we constructed the heaviest portion of this spur, and carried it through some distance beyond the Arctic Chief mine, and to a property known as the Best Chance. Beyond that point the work is all light, and I believe that inside of two months the rails can be put down on the remainder of the spur. The road built this season was exceptionally heavy, as we had to contend with large rock cuts and muskegs. The work was performed in a thorough manner, and when operations were stopped on September 15 we had really done more than we expected to this year.

"At Skagway ore bunkers with a capacity of 5,000 tons were built ready for service. These are loacted right off the end of Moore's wharf and ore-carrying steamers will be loaded directly from the bunkers.

"Despite the fact that the depression had its effect on mining activity as had also the low price of copper, I am very glad that our company decided to build a portion of the spur last summer, for the reason that it was possible for us to obtain plenty of labor, something we could not have done in any ordinary year.

"While the north suffered from the depression this year in common with the rest of the country I am certain that next year conditions will be much improved. Of course, where placer mining is carried on with dredges operators are always one year behind the adoption of their plans owing to the fact that it takes that length of time to get their machinery and equipment built and laid down on the ground. This being the case it was not to be expected that any large new plants would be installed in the Yukon this year because in the fall of 1907 it was impossible to interest capital in even the certainty of a Klondike gold mine. Next year will be a prosperous one in the north."

More work is being done on Dominion Creek this winter than any time during the last two winters. Many lays are being worked and a large number of the owners are participating in the opening of the ground.

Upper Dominion is not so busy as that portion around Granville, but is far from being dead. Many claim owners and laymen wil have large dumps out by spring as evidence of their activity.

From No. 33 down there is much activity. Foley Bennett on 34 and 35 has 19 men on his ground, some working as laymen.

On 76, 80, 96 and 97 many men are engaged in mining as laymen. On 2 below Hufford, Campbell, McQueen and Mexican Jack are working a lay. A number of laymen also are working on Caron's ground on 10.

Frank Morrison, the heaviest Dominion operator, who did much open cutting during the summer, is preparing to operate in the coming summer on a larger scale than ever, but is not taking out dirt just now. Pete Rost, who also has become a big summer operator, is not working any men just now, but is on the creek and may be making a winter showing before long. Cason Brothers and Lemore & Modren were among those who made big open cuts on Dominion during the open season.

The claims mentioned individually in the foregoing are but a few of those working on Upper Dominion this winter, but enough to indicate there is something doing on the famous old creek.

Transferring Dredge.

The Yukon Gold Company will transfer one of its dredges now on a creek in the Atlin District to Dawson next season. A report to this effect is brought by a recent arrival from the Atlin district. It seems that the dredge, which has been in the Atlin district the last two or three seasons, has encountered too many boulders there. The impractibility of operation of that ground with a dredge is admitted, and the big machine is to be moved to the Dawson district, where gravel and other conditions are favorable.

Steam shovels have had better success in the Atlin district. When they encounter boulders they can work around them and leave them to be swung out of the way by derricks.

Hydraulic mining also is demonstrated to be a great success in the Atlin district. The ground is little if any frozen, and the season is long.

One Atlin operator adopted an unique means of digging a ditch several miles in length for bringing water to his property. He built a scow, launched it in a lake, mounted a steam shovel on the scow, and began digging along a certain grade from the lake toward his hydraulic location. By following the proper grade, he eventually made a first-class ditch with water running through it, and the steam shovel on the ground ready to assist in the work. The shovel was wrecked a time or two during the digging of the ditch but no serious damage resulted.

There was an explosion of fire damp in the Radboo mine at Hamm, Westphalia, Germany, November 12th, which probably will result in heavy loss of life. Already twenty-seven bodies have been brought to the surface and 300 men are still underground in grave peril. Four hundred miners were working in the pit at the time of the disaster. About 7 have been brought to the surface. Of these a majority are more or less injured, and one has since died. One hundred and fifty men are in shaft No. 2, and it is believed that all are doomed. Rescuers arrived from all directions and the work of getting below was at once organized. These efforts, however, were necesarily slow and attended with extreme difficulty. One of the shafts, together with its elevator cage, has been completely burned out. An improvised cage was sent down with a corps of rescuers, who made heroic efforts to reach their comrades. At one o'clock the fire had made such headway that the rescuers had to be called back to give way to the fire fighters, and the flames are still spreading. The vicinity of the mine is surrounded by police. A total of thirty-five bodies had been brought to the surface up to 4 o'clock this afternoon. Eighteen of the men who got out alive are severely injured. No hope is entertained for the 300 men still below ground.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Monmouthshire coal-owners have decided to establish a rescue station.

The Hickleton Main colliery, near Doncaster, claims to have established a new record, in winding in one day of 13 hours 4,072 tons of coal from one shaft.

GERMANY.

The greatest mine disaster in many years occurred on Nov. 12th at the Radbod coal mine, near Hamm, Westphalia, an explosion being followed by a fire. Of 380 miners only about 40 escaped, many of them badly injured. Many dead bodies have ben taken out, the attempts to rescue the emtombed men being fruitless owing to the headway made by the fire.

RUSSIA.

There was a record output of iron ore in 1907, the total amounting to 4,227,419 tons exclusive of manganese ore exported from Poti, which were 881,322 tons, as compared with 464,016 tons the previous year. There was an increased demand in Germany for South Russian iron ore, 1,613,000 tons being shipped to that market, as against 535,000 tons in 1906. A marked increase was also shown in the production of pig iron.

SWEDEN.

Sweden is resorting to peat as a fuel in order to avoid dependence upon British coal. The country is stated to possess the largest peat deposits of any in the world, excepting Russia, and many inventions to utilize peat in the form of briquette and powder are being experimented with. The railways have been making trials with British coal, Swedish coal and peat, separately and mixed, to ascertain the most economical form of fuel. The total extent of the peat deposits is estimated at 8,000,000,000 tons.

AUSTRALASIA.

The coal in the Mackenzie River district, Queensland, is attracting attention. An examination to be made by diamond drill on a group of coal-prospecting areas extending for 25 square miles, near Tryphinia, on the Central Railway. The Mount Morgan Gold Mining Co. is interesting itself in exploration for coal near Bluff, where they have large buildings.

SOUTH AFRICA.

Increased activity at the diamond mines is reported. The Premier is making preparations for a greatly increased output and is installing a new plant capable of treating 15,000 loads per day. At the Voorspaed mine, Orange River Colony, washing operations have been begun with a new plant, the yield averaging about 20 carats per 100 loads.

A number of amalgamations of mines in the East Rand are being carried through. The Modderfontein Extension and Transvaal Lands and Mines Proprietary Syndicate have been merged, and among other amalgamations in process are those of the Chimes West and Benoni and of the Van Ryn Deep and Kleinfontein Deep.

UNITED STATES.

Mr. Samuel Newhouse, of Salt Lake, has purchased the Silver Peak Valcalda mines at Blair, Nev.

The Croesus Gold Mining and Milling Co., eperating the old Plumbago mine, near Alleghany, Sierra Co., Cal., is installing one of the most complete electric power plants in the State, and will considerably extend their workings.

The Fink furnace, which it is claimed will save half the cost of fuel, is to be tested on a commercial scale at Garfield, Utah, on the premises of the Boston Consolidated Mining Co., where a plant capable of treating 100 tons a day is being installed. The device consists of two revolving revedberatory furnaces, a central fire-box and a cluster of air pipes installed between the furnaces. By the revolution of the furnaces during the heating process it is claimed that new surfaces are constantly exposed where the heat blown in is most intense. It is asserted that blister copper can be produced with one melting, and that no coke will be required.

All the Arizona mines of prominence are very busy, and the total copper output for October is stated at 27,862,000 pounds. This was the largest monthly product this year, and from present indications Arizona will probably head the list as the largest producer of copper for the year 1908. For the first ten months of this year the Arizona production is estimated at 28,952,270 pounds more than that for Montana during same months. The Copper Queen mine is now the largest single producer with a monthly output of over 8,000,000 pounds.

The Greene mine is getting on its feet again, and for the month of October obtained an output of 3,854,000 pounds of copper, 95,506 ounces of silver and 698 ounces of gold. The new improvements are said to have resulted in reducing costs to less than to cents. The old plant was able to turn out 50,000,000 pounds of copper per annum, but the new management figure on a future production much larger than formerly.

Six men were instantly killed in a mine cage accident at the Ellsworth mine, Washington Co., Pa., on Nov. 16th. Owing to a break in the machinery the cage fell 285 feet to the bottom of the shaft.

INDIA.

The Indian Government has authorized the construction of a railway from the Gurakushinit Hill to Kalamati, where the Tata melting works will be established.

The production of coal was greater in 1907 than in any previous year. Bengal produced 9,993,548 long tons, valued at u2,208,091, and the output of the other provinces was 1,153,991 tons.

MEXICO.

There has been great activity in prospecting for and developing oil lands in different parts of Mexico, and several American syndicates have obtained options covering extensive tracts in the States of Tamaulipas, Vera Cruz and Chiapas. A number of drilling outfits have been brought from the United States.

COMPANY NOTES.

Mr. E. F. B. Johnston, K.C., presided at the meeting of shareholders of the Foster Cobalt Company, Nov. 5th, and explained the details of the report.

The company is said to have had three valuations on its ore dump, and these have varied from $15,000 to $50,000.

That part of the report dealing with the finances is as follows: "The present stock of ore on hand ready for shipment consists of about 30 tons of ore high in Cobalt, but low in silver. The prospects for early shipment of high grade ore is uncertain, depending entirely upon the results of the development indicated above.

"The results of some concentration done on ores from the dumps confirm the belief that these dumps contain values variously estimated at from $15,000 to $50,000. During the coming winter months when transportation is cheap, large quantities of this ore will be sent to the concentrator, where arrangements are in effect under terms distinctly favorable to the company."

Live Assets.

The financial statement submitted to the meeting showed the following live assets. Cash on hand and in bank, $17,342.18; due from smelter and ore sales, $24,185.42; accounts receivable, $476.44; supplies on hand, $2,379.56; total, $44,383.60. Also there is the ore in the ore house and in the dump variously estimated as worth sums up to $50,000. To offset the assets are wages due and accounts payable aggregating $4,454.74, so that deducting these, and valuing the ore at $18,000, the mine has $53,028.86 to the good, wherewith to operate, easily enough to run for another year if no further values are extracted.

The operating account for the year showed that $39,000 had been spent in ore extraction, and $37,000 in development, other expenses bringing total expense for the year up to $198,835.49. This is offset by $76,461.13 as the result of ore sales, $145 for rents, $1,099.60 from interest and exchange, and the balance $31,129.74 has come from the balance brought forward from last year of $82,624.13, reducing the present balance, as per balance sheet to $51,494.57.

Practically no objecting to the course of the directors were expressed at the meeting. The old board of directors was re-elected by acclamation.

The dividend on the Buffalo mine stock is now at the rate of 32 per cent. per annum. In a letter to the shareholders President Denison says that the increase would have occurred earlier, but he was waiting for a better silver market. The company apepars to have had the usual trouble crushing the ore, which is very hard, and Mr. Denison states that the capacity of the machinery did not come up to recent expectations. However, the new electric water pump, the cyanide plant, etc., have, in the president's words, "meant increased production at less expense and an increased revenue from what has been an accumulating, though heretofore idle, asset, namely, the ore going on the dump piles." The company will use the funds received from the distribution of the treasury stock to enlarge the concentrating and cyanide plants. The president says that dividends have ben paid from earnings, while development work progressed, and that there are now ore bodies in sight of greater value than he ever expected to see in this or any other Cobalt property.

A meeting of the bondholders of the Dominion Copper Co., Ltd., for which a receiver was apointed some time ago, will be held on November 30th at the office of Guggenheimer, Untermyer & Marshall, No. 37 Wall Street, to receive a report from the trustee of the bondholders as to the action which has been taken, and to consider such other matters as may be brought before the meeting.

The La Rose Mines, Ltd., makes the following preliminary statement of production and earnings for October:

	Tons.	Silver contents. Ounces.	Net value.
Shipments.	541	199,271	$88,890
On hand Oct. 31.	94	102,454	47,456
Total.	635	301,725	$137,346
Less on hand Sept. 30	142	106,287	49,930
October production	493	195,438	87,416
Estimated expenses..	...	.....	23,207
Net profit for October	...	.....	64,209

Total for June, July, August, September and October silver contains 1,230,180 ounces; net profit, $484,853.

The annual meeting of the Green-Meehan Mining Company was held on November 7th. It was explained that the reason work was stopped on the mine was because the values petered out, and the directors wished to wait to see how other mines succeeded in their experiments as to how much ore was to be got deeper down.

Whilst this explanation was accepted, it may be termed an explanation only by courtesy.

The work was stopped on December 15th, 1907, and preparations to continue it were started a week ago on information received, but not vertified, as to the ore to be found at a depth.

The money in the treasury will enable the company to keep working for some time. Two hundred thousand shares of stock were put in to operate the mine two months before the work stopped.

The shareholders were not satisfied with the reasons advanced as to why the work stopped, but E. B. Ryckman, the chairman, said they were the only reasons he had. They said that not sufficient effort had been made by the dicetors to carry on the worik.

An engineer was asked recently to go up and take charge of the mine. Ii ts three-quarters full of water, and the trench is two-thirds full. This water has been accumulating ever since work stopped. It is estimated that $200 will take it all out.

One director sold 14,000 shares to a friend, but of the 700,000 shares held by directors that is the only sale known.

The chairman was asked why the treaspry stock was not sold when it was around 170. He said the reason was that the expert said there was enough value in sight to run the mine, and they had made so much in the first couple of months that they decided not to sell.

There is about $25,000 worth of low grade ore now on the property.

Twenty-seven thousand dollars will be spent to see if any results are to be obtained from the mine.

The chairman said that the directors have spent $50,000 of their own money.

They expect to sink the shaft at an expense of $40 per foot.

At the annual meeting of shareholders of the Cobalt Townsite Mining Company, Limited, held at North Bay, a new board of directors was elected, consisting of Eric H. Rose, London, England; Thos. Plunkett, New York; Rupert Simpson, Simcoe, and W. R. P. Parker, Toronto. The new officers of the company who were elected were: President, W. R. P. Parker; vice-president, Rupert Simpson; treasurer, E. H. Rose.

The reports of the managing director and of the manager of the mine were received and considered, and were of a satisfactory nature.

It is said that there have been some recent strikes of unusual value on the property, and a strike on the Right of Way of a vein traced into the property of the Cobalt Townsite Company.

At a meeting of the directors of the Tretheway mine on November 13th it was decided to make a 10 per cent. distribution of profits on December 15th. The company will not adopt the practice of declaring dividends at stated intervals, but will disburse the profits among the shareholders whenever a sufficient surplus accumulates in the treasury.

The last dividend of $2 a share on Granby Consolidated will make $4 for the year.

The dividend record of Granby is as follows, on basis of $100 par value:

1908	$4	1905	$3
1907	9	1904	0
1906	12	1903	1

The initial payment was made December 16th, 1903.

STATISTICS AND RETURNS.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works of the Province of Ontario for the nine months ending September 30th ,1908, was as follows:

		Value.
Arsenic, tons	464	$19,892
Cobalt, tons	480	80,623
Gold, oz.	2,504	40,797
Silver, oz.	12,223,834	6,141,090
Copper, tons	5,892	837,559
Nickel, tons	7,760	1,494,693
Iron Ore, tons	166,088	448,532
Iron Pyrites, tons	13,417	43,948
Pig Iron, tons	189,287	3,098,661

Shipments from the Cobalt mines during the period amounted to 18,325 tons, including 480 tons of concentrates. Arsenic in the above table represents only the quantity recovered by reduction works in Canada, and cobalt only the cobalt contents of shipments for which mine-owners received returns.

INTERCOLONIAL COAL CO.

Shipments, Oct., 1908	18,304
Shipments, Oct., 1907	19,973
Decrease, Oct., 1908	1,669
Shipments, 10 months, 1908	210,296
Shipments, 10 months, 1907	222,547
Decrease, 10 months, 1908	12,251

CUMBERLAND RAILWAY AND COAL CO.

Shipments, Oct., 1908	28,992
Shipments, Oct., 1907	nil
Increase, Oct., 1908	
Shipments, 10 months, 1908	305,516
Shipments, 10 months, 1907	213,409
Increase, 10 months, 1908	92,107

INVERNESS RAILWAY & COAL CO.

Shipments, Oct., 1908	25,506
Shipments, Oct., 1907	22,275
Increase, Oct., 1908	3,251
Shipments, 10 months, 1908	218,236
Shipments, 10 months, 1907	198,847
Increase, 10 months, 1908	19,389

ACADIA COAL CO.

Shipments, Oct., 1908	26,308
Shipments, Oct., 1907	31,987
Decrease, Oct., 1908	5,679
Shipments, 10 months, 1908	265,389
Shipments, 10 months, 1907	262,230
Increase, 10 months, 1908	3,159

CROW'S NEST COLLIERIES.

The output of the Crow's Nest collieries for the week ending November 6th was 19,634 tons, a daily average of 3,272 tons.

The output of the Crow's Nest Pass Coal Company collieries for the weey ending November 20th was 19,927 tons, a daily average of 3,321 tons. Week ending November 22nd, 1907, 18,508 tons, a daily average of 3,085 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp and those from January 1st to date:

	Week end. Nov. 7. Ore in lbs.	Since Jan 1. Ore in lbs.
Buffalo	104,000	1,916,950
*Coniagas	64,430	1,297,288
Crown Reserve	120,000	714,688
City of Cobalt	670,000	1,306,300
Foster	140,000	487,300
La Rose	197,000	7,528,970
McKinley-Darragh	285,000	2,859,770
Nova Scotia	40,000	487,675
Silver Cliff	46,100	98,100
Townsite	40,600	292,300
Temiscaming	63,360	994,980
T. & H. B.	60,000	2,338,666
Tretheway	60,000	2,102,476

The total shipments for the week were 1,287,490 pounds, or 643 tons. Total shipments from Jan. 1 to date are 36,541,756 pounds, or 18,278 tons.

Following are the weekly shipments from Cobalt camp, and those from Jan. 1 to date:

	Week end. Nov. 14. Ore in lbs.	Since Jan. 1. Ore in lbs.
Chambers-Ferland	60,000	443,890
City of Cobalt	61,700	1,368,000
Kerr Lake	61,400	1,152,794
La Rose	395,500	7,924,470
Nispissing	293,740	3,235,350
O'Brien	255,180	6,101,337
T. & H. B.	60,000	2,193,666

The total shipments for the week were 1,187,520 pounds, or 593 tons. Total shipments from Jan. 1 to date are 39,251,056 pounds, or 18,627 tons.

COBALT ORE SHIPMENTS.

Fololwing are the weekly shipments from Cobalt camp and those from Jan. 1 to date:

	Week end. Nov. 21. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	1,016,950
Coniagas	.....	1,097,288
Cobalt Lake	.....	404,623
Crown Reserve	116,000	830,688
Crown Central	40,860	527,935
Chambers-Ferland	.....	443,890
City of Cobalt	.....	1,368,000
Drummond	.....	1,291,520
Foster	.....	437,300
Kerr Lake	.....	1,152,794
King Edward	.....	127,240
La Rose	217,990	8,142,460
McKin.-Dar.-Savage	180,700	3,031,470
Nipissing	299,680	3,535,030
Nova Scotia	.....	487,675
Little Nipissing	.....	40,110
Nancy Helen	41,500	408,977
Peterson Lake	.....	41,237
O'Brien	127,600	6,228,937
Right of Way	62,159	1,300,770
Provincial	.....	143,310
Silver Leaf	.....	372,900
Silver Cliff	60,000	158,100
Silver Queen	.....	158,100
Silver Queen	.....	1,556,390
Townsite	.....	292,300
Temiskaming	60,000	1,054,980
T. & H. B.	.....	2,193,668
Tretheway	64,000	2,166,470
Watts	.....	561,680

The total shipments for the week were 1,270,480 pounds, or 635 tons. Total shipments from Jan. 1 to date are 40,478,606 pounds, or 20,239 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000.

B. C. ORE SHIPMENTS.

The following are the ore shipments for the past week ending November 7, and year to date:

BOUNDARY SHIPMENTS.

Total	37,024	1,203,275

ROSSLAND SHIPMENTS.

Total	6,797	250,966

SLOCAN-KOOTENAY SHIPMENTS.

Total	3,361	103,590

The total shipments for the week were 47,184 tons and for the year to date 1,557,831 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	22,367	887,544

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	11,779	276,183

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	9,953	273,789

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	1,268	66,509
Queen	27	837
Other mines	225	5,821
Total	1,520	73,161

The total receipts for the past week were 48,379 tons and for the year to date 1,538,279 tons.

BOUNDARY SHIPMENTS.

Granby	20,035	907,579
Oro Denoro	950	53,286
Mother Lode	11,566	230,113
Snowshoe	2,249	24,521
Phoenix Amal.	76	394
Other Mines	....	22,248
Total	34,866	1,238,141

ROSSLAND SHIPMENTS.

Centre Star	3,120	150,689
Le Roi	2,017	68,526
Le Loi No. 2	478	25,583
Le Roi No. 2 Milled	260	9,440
Bluebird	34	160
Other Mines	....	2,477
Total	5,909	256,875

GRANBY SMELTER RECEIPTS.

Whitewater Milled	700	25,700
Poorman Milled	125	9,675
St. Eugene	642	22,732
Queen	27	864
Queen Milled	420	8,910
North Star	36	3,801
Second Relief Milled	145	2,490
Arlington, Erie	34	2,284
Richmond	24	2,262
Kootenay Belle Milled	70	1,900
Bluebell	182	1,442
Standard	21	1,165

Rambler-Cariboo	20	1,046
Reco	22	393
Slocan Star	33	382
Westmount	23	370
Nugget Milled	100	270
Jessie Bluebird	26	84
C. H. Pollen	2	2
Other Mines	....	20,363
Total	2,642	106,135

The total shipments for the past week were 43,417 tons and for the year to date 1,601,151 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	20,035	907,579

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	12,516	285,939

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	7,223	281,012

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	2,017	68,526
Queen	27	864
Other Mines	298	6,119
Total	2,342	75,509

The total receipts at the various smelters for the past week were 42,116 tons and for the year to date 1,557,641 tons.

The output of pig iron in the United States will hardly exceed 15,500,000 tons for 1908. This is less than has been recorded since the year 1900. The output for 1907 was 25,781,361 tons.

The out put of copper from the Michigan mines for October is reported at 19,943,340 pounds, which is 736,385 pounds more than the September figures. Lake Superior production for the first ten months of this year is estimated at 188,030,129 pounds, as compared with 190,013,414 pounds returned for the same months last year.

Butte mines are estimated to have produced during October 28,864,410 pounds of copper, and for the first ten months of 1908 the total of 210,845,730 pounds. The Anaconda and Boston & Montana both did better than in September, and these two producers showed an output last month in the aggregate of over 15,000,000 pounds. Montana production since January is estimated at 13,591,477 pounds below that for the first ten months of last year, but at the recent rate of output the differences should be wiped out.

During the nine months ending with September the exports of ores and metals from the United States including the following:—

	1907.	1908.	Changes.
Aluminium, value	$259,984	285,711	I. $25,727
Copper, fine, lb.	280,056,017	520,609,477	I. 240,553,460
Copper in ore, etc., lb.	9,267,464	7,254,638	D. 2,012,826
Iron ore, tons	158,243	191,408	I. 33,165
Iron pig, tons	60,109	30,508	D. 29,601
Nickel metal, oxide, etc., lb.	6,979,881	8,026,950	I. 1,047,069
Quicksilver, lb.	345,297	185,089	D. 150,208
Spelter, lb.	785,498	4,556,301	I. 3,770,803
Zinc ore, tosn	13,991	21,056	I. 7,065
Zinc dross, lb.	16,520,771	13,555,081	D. 2,965,690

The following are the figures of German consumption of foreign copper for the months of January and September, 1908: Imports of copper, 122.55 tons; exports of copper, 6,393 tons; consumption of copper, 116,162 tons, as compared with consumption during the same period in 1907 of 87,480 tons.

Of the above quantity 112,829 tons were imported from the United States.

MARKET REPORTS.

Nov. 20.—Connellsville coke, f.o.b., ovens:—
Furnace coke, prompt, 5$1,75 to $1.85.
Foundry coke, pormpt, $2.15.

Metals.

Nov. 20.—Tin, Straits, 3.03 cents.
Copper, prime Lake, 14.4 to 14.5 cents.
Lake arsenical brands, 14.4 to 14.5 cents.
Electrolytic copper, 13.125 to 14.25 cents.
Copper wire, 15.75 cents.
Lead, 4.35 cents.
Spelter, 5.05 cents.
Sheet zinc, 7.5 cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 25 cents.
Nickel, 40 to 47 cents.
Platinum, $22.50 to $23.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $47 per 75-lb. flask.

Silver Prices.

November 10	49 7-8	23 1-16
" 11	50 3-8	23 5-16
" 12	50	23 1-8
" 13	49 7-8	23 1-16
" 14	49 7-8	23 1-16
" 16	50 1-8	23 3-16
" 17	50 1-8	23 3-16
" 18	50	23 1-16
" 19	49 7-8	23 1-16
" 20	49 7-8	23 1-16

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Some Books of interest on Mining to be had from the Book Department of the Canadian Mining Journal, Toronto, Ont.

The Copper Mines of Lake Superior. By T. A. Rickard. An attractive volume of 165 pages, handsomely illustrated. The present work consists of a group of interesting articles in a revised and amplified form, which were originally published in the columns of The Engineering and Mining Journal during the latter part of 1904. Octavo, cloth. Price, $1.00.

The Chemistry of Cyanide Solutions Resulting from the Treatment of Ores. By J. C. Clennell. Price, 2.50.

Across the San Juan Mountains. By T. A. Rickard. A graphic description of a picturesque ride of 400 miles on horseback through the San Juan Mountains in South-western Colorado. The work is written in vigorous and buoyant style, and the information contained therein, while appealing specifically to the geologist, prospector, and mining engineer, will also prove of great interest and enjoyment to the general reader. Small quarto, cloth, ornamental covers and profusely illustrated. Price, $1.00.

Ore Deposits. A discussion republished from the Engineering and Mining Journal, containing the recent contributions on the origin of ores. By S. F. Emmons, W. H. Weed, F. L. Ransome, C. R. Van Hise, T. A. Rickard, and C. W. Purington. The matter originally published has been revised and amplified. A review of the subject by the Editor of the Engineering and Mining Journal is added. It is an up-to-date discussion of a subject which is of great interest to mining men. The book contains 100 pages. Cloth. $1.00.

Mineral Resources of Canada. An illustrated handbook giving a brief outline of the economic minerals of Canada, and sketching the mineral resources of each province. The book contains 140 pages, 32 color engravings of the most important minerals. The latest mineral Resource Map of the Dominion, showing the chief mineral deposits, is also included. No such work has been attempted in Canada before. This volume should be in the hands of every one interested in the mining industry. The price of this volume is extremely moderate. $1.00.

Minerals and How They Occur. By Willet G. Miller. Provincial Geologist, a volume of 250 pages, illustrated. This book is especially adapted to the prospector for minerals, as he must have a knowledge of mineralogy before he can properly understand the character of rocks and the effects which are produced on them by atmospheric and other agencies. If you are a prospector this is the work for you. Price, $1.00.

The Sampling and Estimation of Ore in a Mine. By T. A. Rickard. Sampling and mine valuation are eminently practical subjects, and in this work they are handled in detail by engineers and experts of the first rank, who have had world-wide experience in these matters. To students, mine directors, mining engineers, mine investors, and engineers generally, this volume will be found extremely useful. Octavo cloth, profusely illustrated. Price, $2.00.

Rocks and Rock Minerals. By L. V. Pirsson, Professor of Geology in Yale University, 414 pages. 74 figures, 36 full-page half-tone plates. Not all mining men have an intimate knowledge of petrology, or the science of rocks. Even those who have had the advantage of a college course find that only a small residue of what they learned adheres to them. Most text-books on the subjects are cast into forms that repel the lay reader. Hence it is not easy for the beginner to acquire the rudiments of the science. "Rocks and Rock Minerals" is an attempt to present the outlines of petrology in such a way as to give an intelligent idea of the subject to readers quite unacquainted with the microscopic standpoint. Rocks and rock minerals are dealt with entirely from a megascopic, or practical outdoors, point of view. The book before us attains the desired object of giving the reader a knowledge of rocks and rock minerals without recourse to the microscope. It is a very fair introduction to the study of geology generally. Part III., in which igneous, stratified, and metamorphic rocks are described, is an excellent treatise in itself. Simplicity is the keynote of the book. Cloth. Price, $2.50 net.

A History of Cobalt. During the summer of 1907 the Canadian Mining Journal published a beautiful illustrated souvenir volume. Included in this volume is a history of the early days of Cobalt. An excellent map of the district accompanies the book. Price, $1.00.

The Electric Furnace. By Alfred Stansfield, D.Sc., A.R.S.M., Professor of Metallurgy, McGill University. There has long been need of a good book on electric furnaces. The increased importance of the subject and the great value to metallurgy makes this book most timely. 211 pages (illustrated) 6 x 9 inches. Price, $2.00

Simple Mine Accounting. By David Wallace. A neat compact description of the simple methods of keeping mine accounts. Mr. Wallace is an expert mine accountant and in this book he outlines briefly and simply the kind of accounts and records which a small mine should keep. 64 pages, 6 x 9 inches, with bookkeeping forms. Price, $1.00.

PROFESSIONAL DIRECTORY.

The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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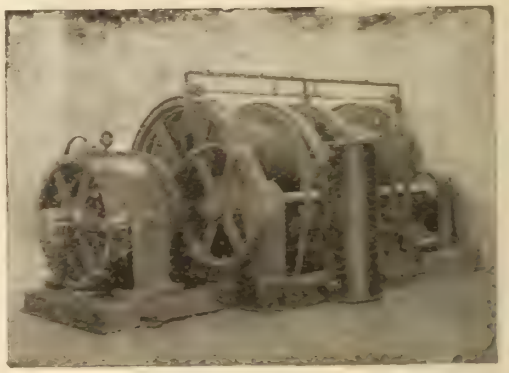
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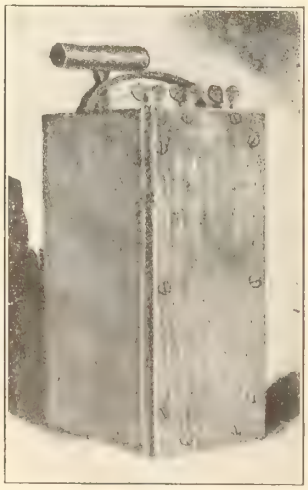
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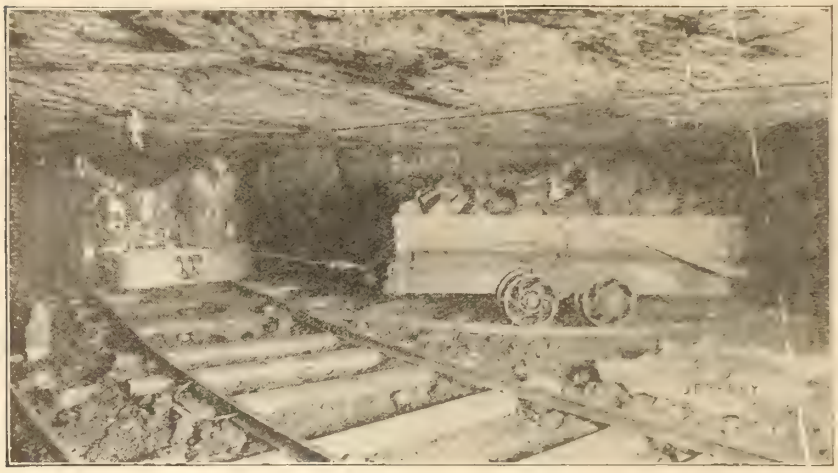
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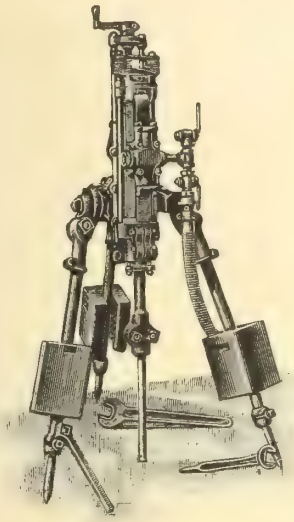
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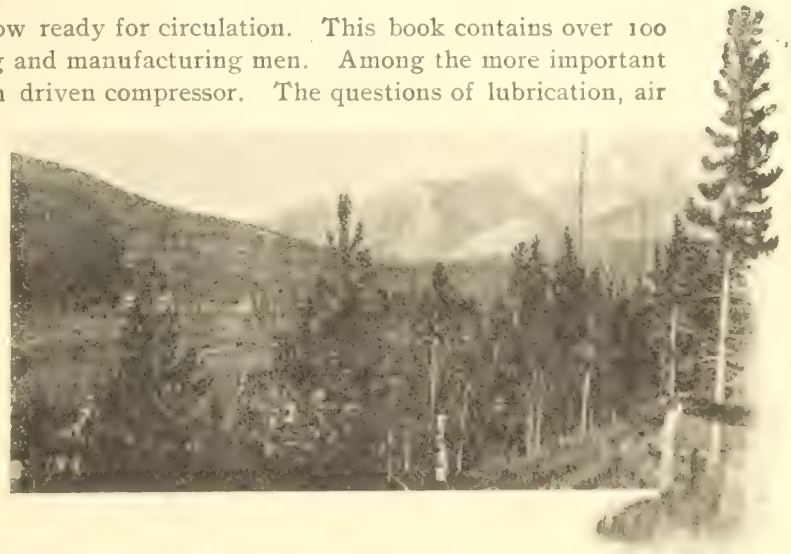
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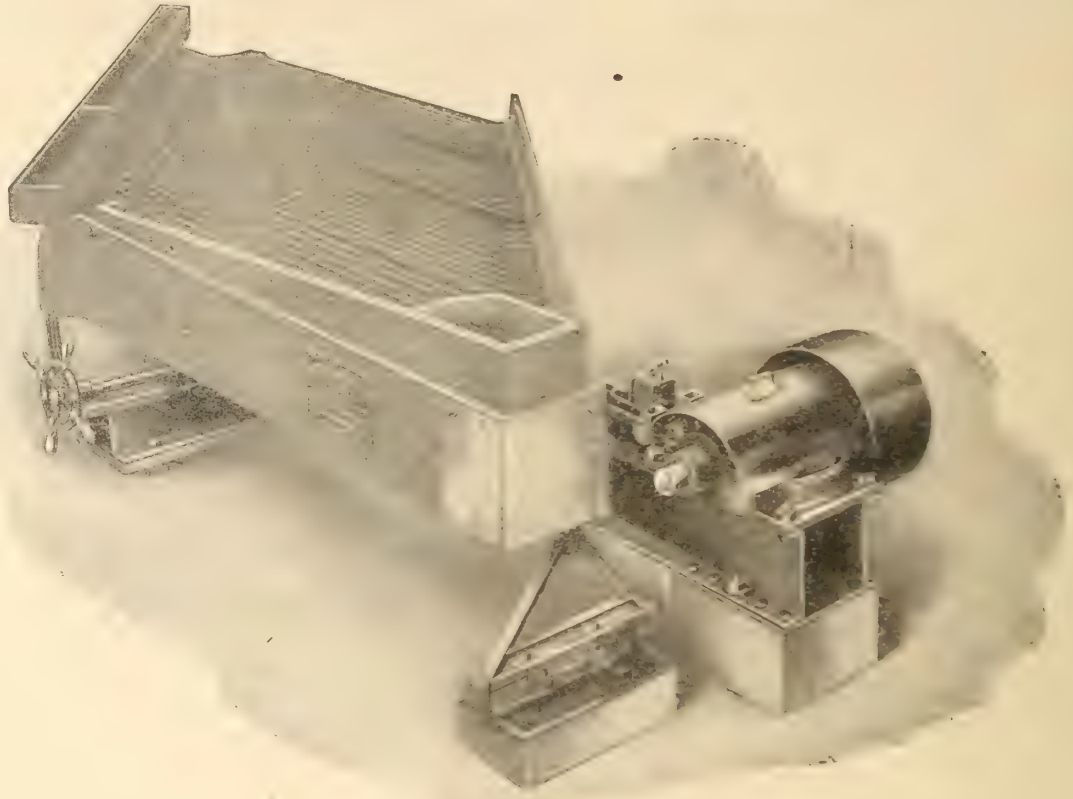


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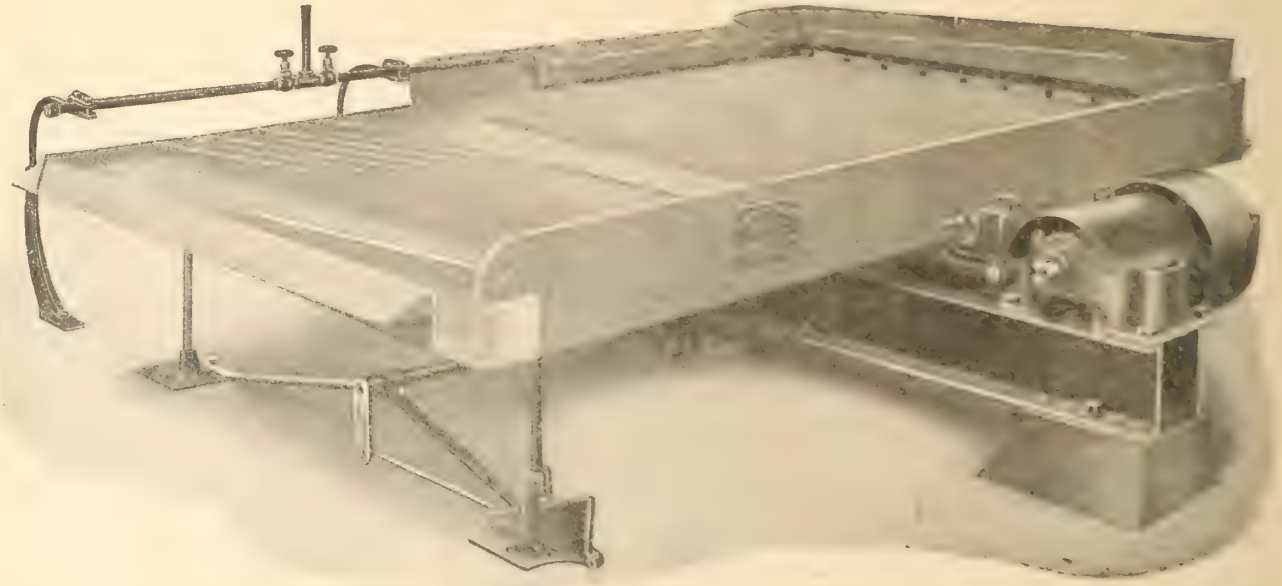
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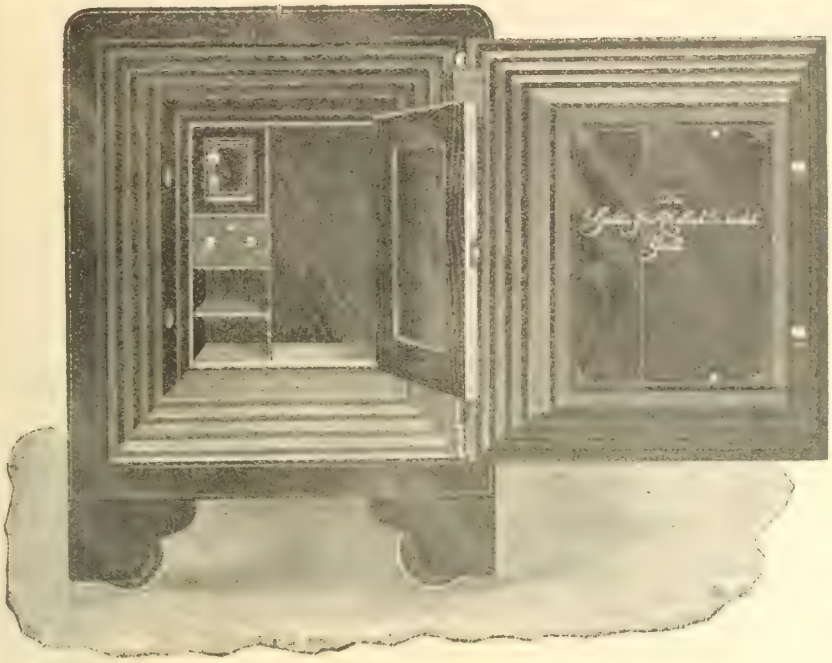


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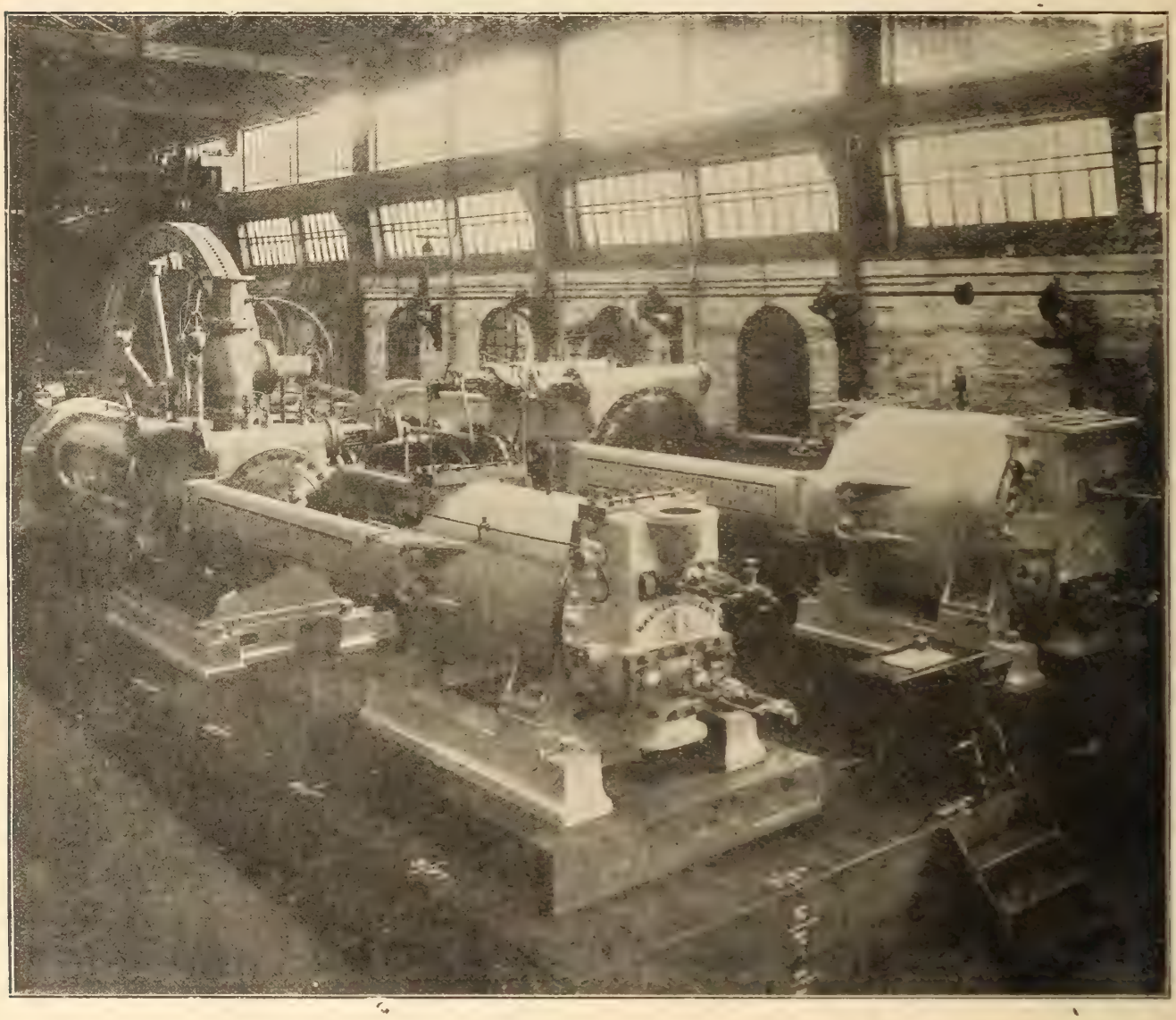
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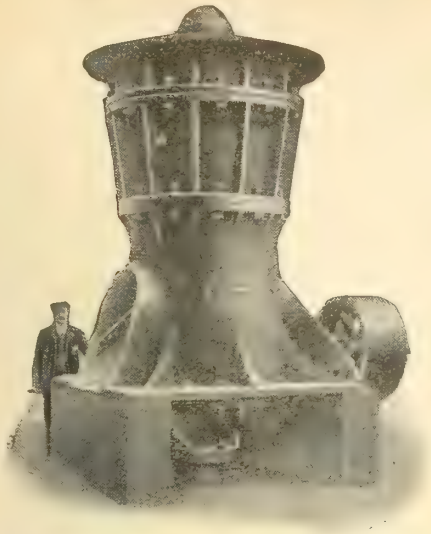
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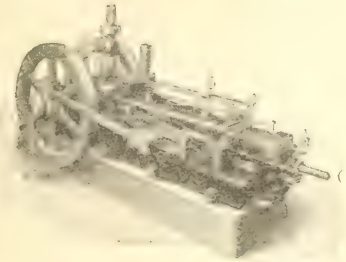
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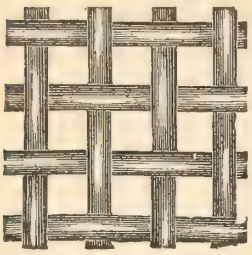
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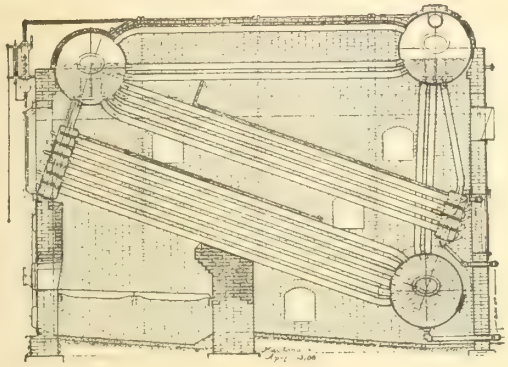
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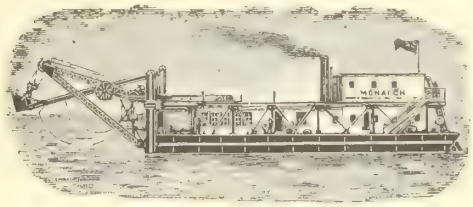
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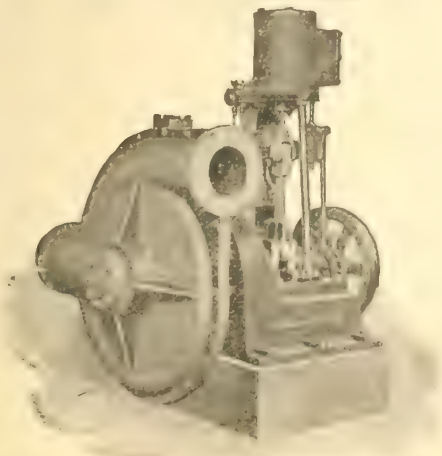
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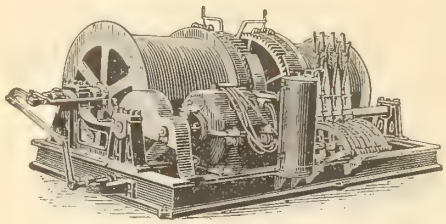
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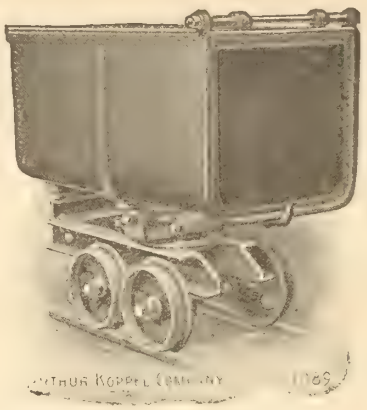
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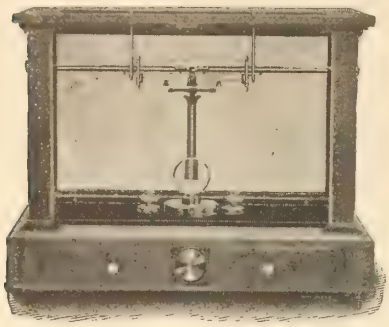
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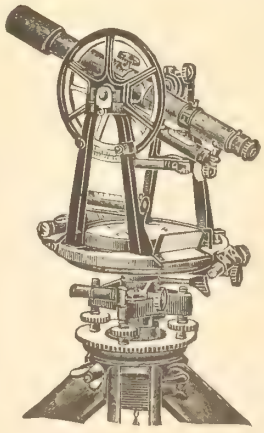
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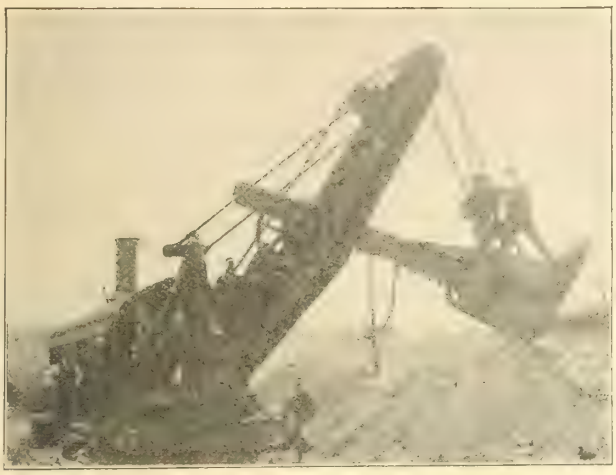
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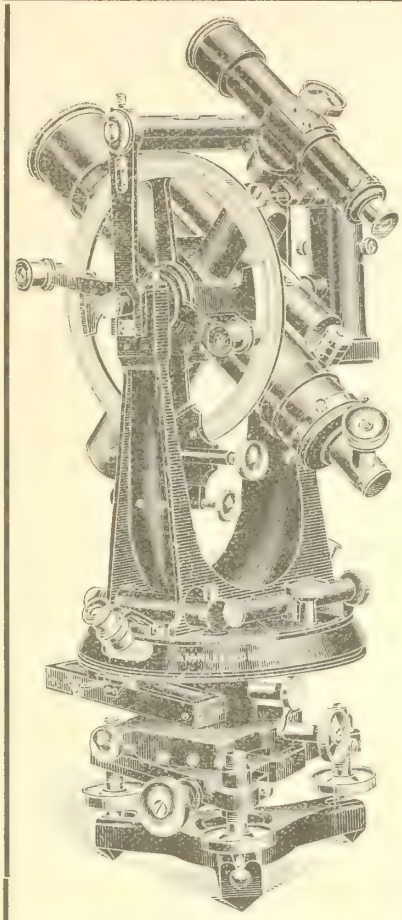
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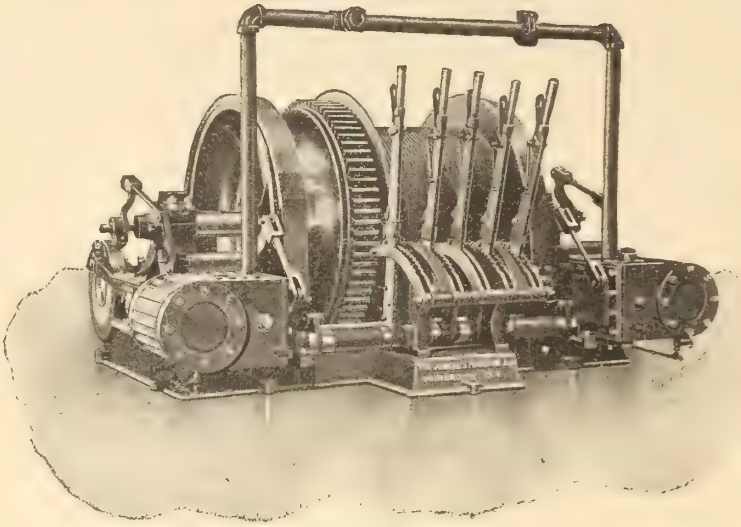
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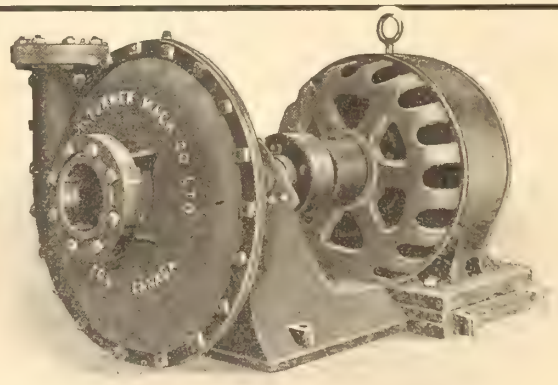
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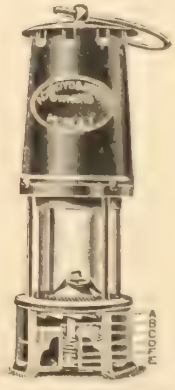
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THE CANADIAN MINING JOURNAL

VOL. XXIX. TORONTO, December 15, 1908 No. 24

The Canadian Mining Journal

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

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CHRISTMAS.

The year that is just about to close has brought success to many a mining camp. From Nova Scotia to the Yukon we are receiving advices that warrant us in expecting largely increased annual outputs. Corporations and individuals have prospered.

The whole beauty of Christmas lies in bringing comfort and joy not only to the members of our own households, but to those whose ways are darkened with suffering and want. And no giving is more seemly, none brings more pure pleasure, than the giving that helps sick and suffering little children.

Our readers will notice in our advertising pages the plea of the Hospital for Sick Children. To the forceful eloquence of this plea we can add nothing beyond the statement that, in our belief, this is one of the noblest and most urgent of all humane institutions.

What better means of truly celebrating Christmas could be chosen by the mining committees of Ontario than in contributing according to their means to brightening the day for sick little cihldren!

MONTREAL RIVER.

There is a discouraging risk attached to any honest expression of opinion about a mining prospect. The most promising surface exposure may lead to nothing. Riches may lie in wait for him who follows a most unlikely outcrop.

But there are prospects and prospects. For instance, in the Nevada goldfields it is not unusual to sink through hundreds of feet of rhyolite before striking pay ore. Knowledge of the immediately surrounding country makes such ventures commercially possible. And there are many analogous cases in the mining districts of foreign countries.

It is well, however, to re-emphasize the plain truth about the Montreal River districts. The most authoritative opinions—here we do not refer to those that are appended to borkers' advertisements—when boiled down agree in all vital respects. These points of agreement may be set out in a few sentences.

The new silver region is worth spending money upon. Several of the properties appear to have exceptional potentialities. The expenditure of money in opening them needs no justification. It is good business.

On the other hand there is not one jot or tittle of common sense in paying hundreds of thousands of dollars for unproved claims. A calm view of the situation reveals at once that there is no basis for such prices. Small quantities of native silver, "strong" outcroppings of calcite, are not mines. Their value is negative, and must remain negative until many dollars are spent in clearing

ground, building roads, and putting in mining equipment. Therefore, it is simply nonsense to talk of selling or buying mines in the Montreal River districts. Let the ardent investor remember that fancy prices are permanent burdens.

Again, when 25 per cent. of your investment disappears in the brokers' pocket, it is not to be gainsaid that only 75 per cent. remains for developing the prospect into a mine. Now, if the stock that you buy is labelled "treasury stock" there is a fair chance of some of your money being applied to the development of the mine. If, however, your company is taking up a page or half a page, or even quarter of a page in the daily papers, it means that you are contributing your quota to an advertising bill amounting in some cases to more than $15,000 per month. This aids the pulp industry.

The happiest issue from your troubles as an investor (and perhaps the best in the long run) is to buy stock that is labelled promoters' stock, or is not labelled at all. You may then be morally certain that your money will not return to you after many days.

THE CONIAGAS MINES, LIMITED.

During the year ending October 31st, 1908, the Coniagas Mine, of Cobalt, Ont., yielded 1,444,229 ounces of silver at a cost of about 15.6 cents per ounce. Among the fortunate shareholders the sum of $440,000 was distributed in dividends. There is still, as will be seen from the statement on another page of this issue, a healthy balance left over.

It is gratifying to note that the ore in sight is estimated as carrying thirteen million ounces. In other words there is approximately enough ore developed to maintain production for four years with the present annual output doubled.

There will be, sooner or later, substantial profits reaped from the Company's smelter at Thorold. The concentrating mill at Cobalt has passed through its bilious period. The production of power has been cheapened by means of a gas producer. The mine is in good condition. Twelve of the forty acres held by the company, have been partly developed at a relatively low cost. The deepest level is only 150 feet and we have the official assertive that there is no diminution at that depth of the silver tenor of the ore, which, apparently averages about $230 to the ton.

We use the word "apparently" for due cause. The report, interesting as it necessarily is, leaves much to be desired. On account of the form into which the principal accounts are thrown it is impossible to determine anything but the total cost of all operations. The plans that accompany the report are clear and instructive.

The Coniagas Mines, Limited, as a corporation has made no apepal to the public. It has, from its inception, minded its own business efficiently. Its expanding operations mean employment for more Canadians and the addition of much clean money to the country's wealth.

SIR HENRY WILKINSON.

When, in the early "nineties" the Lake of the Woods began to attract men of all kinds and conditions, Lieutenant-General Sir Henry Wilkinson was already a picturesque integer of the group of mining men that foregathered at Rat Portage. His mine, the Regina, was one of the producers. However, it produced gold at a prohibitive cost.

Through thick and thin, through good report and evil report, Sir Henry stuck to his mine. Manager after manager failed to make it pay. Sir Henry, with that singular British admixture of tenacity and impracticality, stuck to his guns. We believe that his faith in his mine never waned for a day or an hour.

Sir Henry died at Kenora a few weeks ago. He will be sincerely mourned by all who know or had to do with him. A courteous gentleman, he was above reproach in all his dealings.

But his life was given a deeper color by the consistent frankness with which he professed and followed the teachings of the Christian religion.

Lieutenant-General Sir Henry Wilkinson fought a losing fight, with not one thought of surrender He fought cleanly and he fought steadfastly. What higher praise can any man merit!

RESCUE APPARATUS IN SICILY.

The use of breathing apparatus is every day becoming better known. In March, 1908, the Testasecca sulphur mine in the province of Caltanisetta, Sicily, developed a dangerous fire in the third level in a section where the sulphur ore was particularly rich. The usual course was to seal hermetically a part or the whole of the mine and wait for weeks or months until the fire died out. In this instance, however, although there was a delay of three weeks in waiting for the apparatus, it took only three days to extinguish the fire.

The rescue apparatus used was of the Westfalia type It was reported upon as being satisfactory except for the effect of the heavy fumes of sulphur dioxide upon the more sensitive parts. It will be admitted, however, that a test of this sort in a deep sulphur mine is about as searching a trial as can be imagined.

THE BOUNDARY DISTRICT.

Within the past nine years there have been more than seven million tons of ore shipped from the mines of the Boundary District, British Columbia. This year's shipments, amounting on November 21st to 1,274,966 tons, exceed the total for the year 1907

The largest individual contribution to the grand total of seven million tons is the Granby Mine of the Granby Consolidated. This mine shipped 65 per cent. of the total. Next in order comes the Mother Lode of

the British Columbia Copper Company, which has 20 per cent. to its credit.

It is most encouraging to be able to record largely increased mine outputs for the current year.

THE SKEENA RIVER DISTRICT.

Northern British Columbia is a country of vast distances and of rich promise. Of both the mineral and the agricultural possibilities of a great part of the immense region drained by the Skeena River, but little is known. What scant knowledge we have, however, indicates that there is room here for a whole generation of prospectors and settlers.

Mr. J. C. Gwillim's article, which appears in this issue of the Canadian Mining Journal, we commend to that restless brotherhood whose members are now and always searching for pastures new.

SKEENA RIVER DISTRICT.

By J. C. Gwillim.

The journey from Vancouver to Port Essington, or Prince Rupert, takes from forty to fifty hours. The trip is made on any of the many boats now calling in on their way to more northern ports. It is a voyage without a parallel in the world—so sheltered from the main Pacific ocean that there is seldom any seasickness. For half the way the eastern shores of Vancouver Island are followed quite closely, a scene of mountains, green islands and glittering seas, or arms of the sea, in every direction. Even now this passage presents an almost continuous succession of steamboats, far apart, but in the days to come, when this desirable land is peopled, and the fisheries, timber, farming lands, and mines are fully developed, there will be a sea-going traffic through these waters which may be greater than that of the Great Lakes at the present time.

Nearly all this traffic at present passes through Seymour Narrows, a channel that may some time be bridged. Through this pasage go all the Alaskan boats and fishing boats, also the new traffic between Prince Rupert and Vancouver.

After passing Vancouver Island the land and sea features change considerably. There is the same intermixture of land and water , but the land is more precipitous, and is clothed with a less generous tree growth. There is a general absence of soil; the nakedness of the hilly islands seems only clothed with moss and smaller trees; the beach is a water-mark on the rock which dips steeply into the sea, or a ragged reef-ribbed shallow.

Port Essington and Prince Rupert are both built on uneven, rocky lowlands. Everywhere there seems to be an absence of alluvium or soil; rain, rock, moss and wet beach impress one in the region round the mouth of the Skeena.

The Skeena, like the Fraser, drains a great district from the interior of British Columbia and descends swiftly through the Coast Ranges, but unlike the Fraser has practically no delta. The valley, even at tide water, is comparatively abrupt and narrow. The only flats are narrow, marginal strips, or island bars, covered with great conifers and cotton woods.

Until the present time of Grand Trunk Pacific construction, the Skeena has been the highway only of Indians, Hudson Bay Company boats, and placer miners.

Although the Hudson Bay Company has for years operated steamboats on this river for a distance of 170 miles, from Essington to Hazleton, it is no light undertaking to make the trip.

In Volume III. of the Canadian Mining Institute there is a paper by E. C. Musgrave upon "A Prospecting Trip in Northern America." Mr. Musgrave went to Hazleton by the old steamer Caledonia (now on the bars of the lower river). The trip up the river,, 170 miles, took about three weeks. One week was spent tied up to the bank waiting for the water to rise, the rest of the time in fighting the swift water, with much warping in the worst places.

Midway between Essington and Hazelton is Kitsalas Canyon, a narrow, crooked and short little jagged pair of passages, through a low rock obstruction. A water gauge at this place indicates when it is safe to make the passage, and often boats await the proper conditions of water level for many days.

Our own trip up the Skeena in August last was a lively one. We were hardly over three days from Essington to Hazelton Construction of the railway is proceeding at many points along the lower portion of theh river. The railway follows the narrow marginal flat, or cuts through bold rock promontories which are a part of the steeply rising ranges on that side of the river.

Much of the work of this first 100 miles out of Prince Rupert will be heavy and costly, with little local support after building.

Further up the river there are raised benches of greater extent and less rainfall. Much of this valley is said to belong to a wood pulp concesion, and a considerable amount of the most desirable bench lands is occupied by Indians. Nowhere in Canada, perhaps, is there a main highway and its traffic so largely influenced by its Indian population—a somewhat jealous people, also, who do not regard the changing order with much satisfaction.

Arrived at Hazelton, one finds it is a point of dispersion for other more remote places Although it has been for so long the starting point, and finishing point, of overland journeys to the interior, there seems to be no organized transportation

The chief means of travel is with pack-horses. These may be hired from the many Indians who traffic in horses and freight throughout the district.

Hazelton is hardly the centre of a productive district; it is more like the funnel entry to the Pacific coast from a great interior region full of possibilities in the agricultural and mining industries.

From Hazelton one can go northwards up the Kispyox and Skeent Valleys and into that little known land towards the Yukon; eastwards one hudred miles to the placer camps of Omenica; and beyond it, to the north, are the new Ingenica placers. South-eastwards is the Bulkeley Valley, on the route of the railway, and further south and east the wide belts of agriculture land in the Nechaco and other districts.

Concerning the agricultural possibilities of this region,

it may be said that the valleys appear eminently fitted for any crop where leaf or blade is chiefly required. Roots also do well. The natural vegetation is a matter of astonishment and also, sometimes, of vexation. No frost had damaged anything at Hazelton on Sept. 10th last, when we left.

Concerning the mineral resources, the district is one of great distances, and not yet much prospected excepting a few camps on the Telkwa river, which lies 60 to 80 miles south of Hazelton. Although the district or region as a whole is much easier to get about in than Kootenay, it has only a few trails and few inhabitants, all of whom are a long way from cheap and ready supplies. The main discoveries so far have been in the Babine mountains, 60 miles south of Hazelton, and in the Telkwa river basin, 60 to 80 or 90 miles south by trail from Hazelton Every pound of supplies is packed in to these places which makes operation a costly and troublesome business.

Although this district has been more spoken of as a copper-bearing district, there are many widely scattered occurrences of silver-lead ores, such as those of Milk Creek, Hudson Bay Mountains, Babine Mountains, and at points on Skeena River above Hazelton, also in Omenica. These places are far apart, and they indicate, at least, a very wide mineralization, and a large enough field for a great number of prospectors.

The copper deposits are of two main types, a large low grade chalcopyrite type in or about dykes, and a small fissure like type of bornite or chalcocite ore.

None of these are within, at present, a reasonable reach of transportation and very little is being done, or likely to be done, until the main-line of railway is built, and there is a further influx of population in the way of miners and prospectors.

Concerning the coal and mineral resources generally, and the geology of the Telkwa country, much information will be found in the summary reports of the Geological Survey for the last two or three years.—(Reports by W. W. Leach, and in the reports of Mr. Robertson, Prov. Mineralogist for British Columbia.)

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

ARTICLE III.

By F. W. Gray.

The Harbour Seam.

Next in importance to the Phalen Seam in the Glace Bay Basin ranks the Harbour Seam, so-called from the fact that it crops out in the shore of Glace Bay Harbour and was first worked there. It appears to have been one of the first seams to be mined after the General Mining Association relinquished their monopoly in 1858, and it seems to have been more extensively worked than the Phalen Seam for several years after this. Mr. Richard Brown in his "History of the Coal Fields of Cape Breton" states that the seam was opened in the spring of 1858 by Mr. Archbold, who drove levels in from the shore both at Glace Bay and Bridgeport and shipped the coal to vessels lying at anchor in the open Bay by means of scrows.

Previous to the formation of the Dominion Coal Company the most extensive workings on the Harbour Seam had been carried on by the Glace Bay Mining Company, who owned a small but strategically valuable area that took in the whole of the outcrop of the Hub Seam, a large portion of the Harbour Seam and the shores of Glace Bay Harbour, or rather what was then, as Mr. Brown describes it, "the long, narrow pond at the head of Little Glace Bay." The present harbour is almost altogether artificial. It was dredged out in the first instance by the Glace Bay Mining Company, who built the entrance piers, and are stated to have spent over $110,000 previous to 1886 in forming the present harbour, which, as the successors of the Glace Bay Mining Company, the Dominion Coal Company now own.

During the past few years the harbour has been still further improved by dredging, and new range lights and buoys have been provided by the Dominion Marine Department.

It is interesting to note that the amalgamation of the two companies working the Harbour Seam in the Glace Bay Basin, gave the present company some of their most valuable properties; namely, the key to the submarine coal field at Table Head and Glace Bay Harbour, the International Company's railway to Sydney and shipping facilities to Sydney Harbour

The seam averages about 5 feet 6 inches in thickness. It yields a hard coal having a high percentage of volatile matter and a comparatively small percentage of ash, which renders it especially suitable for gas-making purposes. Almost immediately above the coal there is a thick bed of sandstone with shale platings and numerous vertical joints. A certain amount of surface drainage percolates into the layers and flows down the vertical joints, for which reason the Harbour Seam is a little wet in the land area.

The Glace Bay Mining Company sunk a shaft near the shore of the Harbour about forty feet deep, and shipped their coal directly out of the mine car into vessels at the wharf. In 1876 two shafts were sunk about half a mile to the deep of the first shaft, reaching the Harbour Seam at 240 feet and known as the Stirling Shafts. The Harbour Seam was worked from these shafts until the property was taken over by the Dominion Coal Company, who closed the mine in 1895 and allowed it to fill with water The Stirling Yard is now used as a storage yard for lumber, equipment and general stores used by the Construction Department. During its life about 2,00,000 tons were extracted from the Stirling Mine.

The entire output of the seam from 1858 to the present time is eight and three-quarter million tons, of which quantity five and one-quarter million tons, or 60 per cent. of the whole, has been mined under the present management since 1893.

The two mines at the present time operating on the seam are International Colliery, now known as No. 8,



Glace Bay Harbor 20 years ago. Shows the old Caledonia Pier, and in the distance the Pier of the Glace Bay Mining Company, looking seaward. Photo loaned by Mr. C. H. Rigby.



Glace Bay Harbor 1908. Showing Schooner Loading Pier and Shores of P. E. Island, looking seaward.

and No. 9 Colliery which is worked to the same shaft as the Phalen Seam at No. 2.

Dominion No. 8 (International).

The International area was first opened up by shore levels in 1858, as previously mentioned. In 1863 the property was acquired by New York people, who formed the International Coal & Railway Company. This company constructed a railway from the mines to Sydney. The present structure of No. 1 International Pier at Sydney was built by the Dominion Coal Company on the original cribs of the pier first constructed by the International Coal & Railway Company.

Since its commencement the mine has put out 4,600,000 tons, of which quantity 2,800,000, or 57 per cent., has been produced since the property came into the hands of the Dominion Coal Company. The output at the present time is about 1,000 tons per day.

As is to be expected at such an old colliery, the equipment of No. 8 is not so large nor so modern as at the newer mines. The power consists of one 212 H.P. and one 318 H.P. Babcock & Wilcox boilers, and two old return tubular boilers of 75 H.P. each. The smoke-stack is of brick, 100 feet high and five feet in diameter. There is also a steel stack 70 feet by 3 feet 6 inches diameter. The old hoisting engine is the one originally put down, and is a 16″ x 32″ horizintal duplex reversible slide valve engine with a drum 8 feet 9 inches in diameter. The shaft, which is the one originally put down, is only 80 feet deep, and with the exception of the Emery Shaft it is the only one of the coal company's mines that has the ordinary rectangular English type of coal cage. The mine cars are run out of the cage at bankhead level, emptied at the screens and returned to the cage. At all the other shaft mines, the dumping cage and end-door mine, cars are used, and the cars do not leave the shaft. The workings are ventilated by an 8-foot fan.

The coal is cut entirely by hand and no machine mining whatever is done.

Although no gas is to be found in No. 8. Marsaut safety lamps are used as a precautionary measure, having been used since 1907. The mine employs about 400 men and has about 50 horses

Dominion No. 9.

The arrangements of this mine, exclusive of the underground workings, were described in conjunction with No. 2 Colliery. The territory at No. 9 is largely submarine, but except in this particular the seam differs in no way from that at No. 8. The accompanying plan will give an idea of the arrangements at the pit bottom, and shows the five compartments in the No. 2 shaft. The pit bottom is walled with concrete and supported by I beams, in the same way as the No. 2 pit bottom described previously. The coal is hoisted by the ordinary dumping cage, and is well sorted on picking belts.

For haulage purposes underground, three Porter compressed air locomotives are in use, of the following dimensions: 7 x 12 inches, 4 wheels, 7 tons; 7 x 14 inches, 4 wheels, 10 tons; 10½ x 14 inches, 4 wheels, 15 tons.

The coal is all machine cut. The output of the mine is from 35,000 to 40,000 tons per month. It employs about 550 men and has 60 horses.

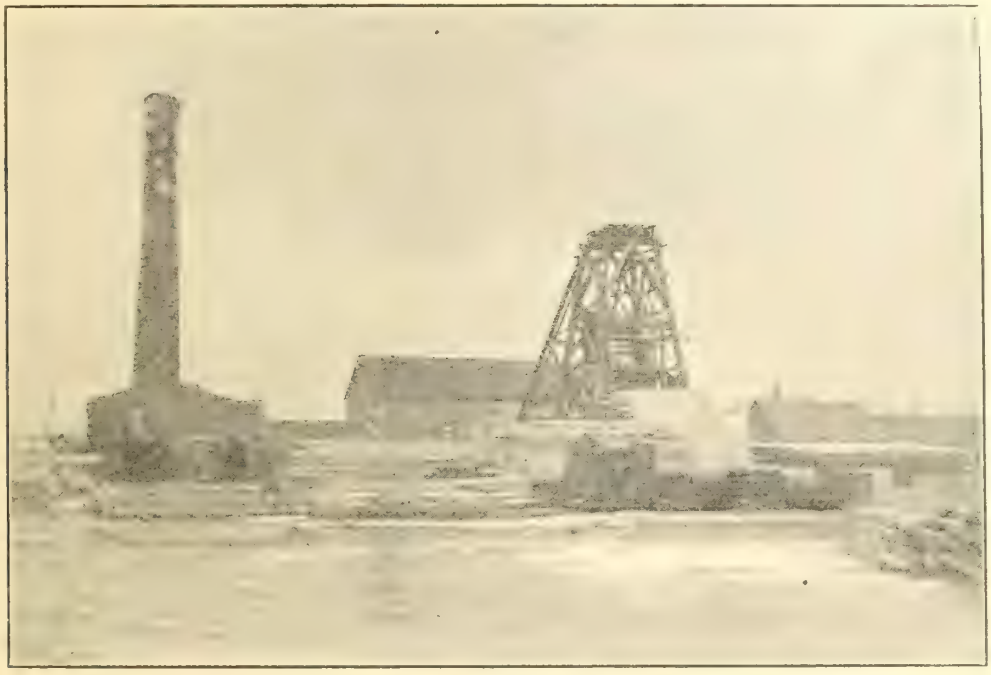


Dominion No. 8 Colliery (International). Harbor Seam.

Pumping.

The water from International Colliery was formerly dealt with by steam pumps which discharged through boreholes at a point midway between the shaft of International Colliery and No. 2 Colliery and adjoining the line of the Sydney & Louisburg Railway. Two boilers were situated here and the steam was conveyed underground by a borehole. In 1906 it was decided to replace this plant by a water shaft and an electrically operated hoisting engine. A shaft was sunk 8 feet by 12 feet 6 inches, and was finished at the beginning of 1907. The coal was reached at a depth of 344 feet, but the shaft was continued to a depth of 370 feet for sumpage. The electric water hoist, which is operated by power from the Central Electric water hoist, which is operated by power from the Central Electric Plant at No. 2 Colliery, was made by the Allis Chalmers Bullock Co. It is driven by a 300 H.P. phase motor, 550 volts, 25 cycles, speed 720 revolutions per minute. There are two water tanks of 800 gallons capacity. The height of the lift is 340 feet; hoisting rope 1¼ inches diameter; hoisting drum 7 feet by 4 feet.

At Dominion No. 9 Colliery there has been, up to the present, a comparatively small quantity of water, but as the workings extend and the pillars are drawn the quantity of water will doubtless become larger, and it is proposed to install an adequate pumping plant very shortly.



The Old Stirling Mine. Yard now used as a Storage Depot for the Construction Department.

MINERAL VEINS IN THE MONTREAL RIVER DISTRICT.

In Volume II. of the Journal of the Canadian Mining Institute, which has just recently appeared are two papers on the above subject which are of especial interest at the present time, when an army of prospector is rushing northward from Cobalt into the Montreal River District and beyond, and active development work on an extensive scale is about to be undertaken on a large number of mining properties where native silver is known to occur.

One of these papers is by A. E. Barlow, and is entitled "The Origin of the Silver of James Township," and the other is by R. E. Hore, on "Cobalt-Silver Ores of Northern Ontario."

Unfortunately both papers are rather too technical in character and diction to be thoroughly enlightening to the ordinary prospector or miner. Nevertheless the following points are enunciated, namely: That the silver-bearing veins are closely associated with intrusive masses of quartz-diabase; and that these intrusives are in the form of laccoliths, injected more or less horizontally, into older rocks, though the former author seems to have forgotten this at times, or possibly there is some uncertainty in his mind on the point, for he speaks of the diabase in one place as a "batholitic mass," and in another place he refers to the "profound fissuring of the diabase," a phrase which could only be appropriately made in reference to a laccolith, if it were of very great thickness.

In addition to the above statements Dr. Barlow's conclusions are as follows:—

"The rock (diabase) is more highly quartzose than usual.

"The presence of the veins is due to a profound fissuring of the diabase itself, formed probably as a result of the contraction of the rock in cooling, the resultant cracks and cavities being occupied in many cases as fast as they were formed by the later, more acid and hydrated segregations from the same diabase.

"The veins in their simplest forms of development are, therefore, essentially of pegmatitic type, although some of the more complex types and those at the other extreme made up almost wholly of calcite or quartz show little or no evidence of such an origin.

The material of the veins is a diabase-pegmatite usually containing calcite.

In order of formation the principal gangue minerals are feldspar, calcite, quartz.

All the gangue minerals appear to have been derived from the surrounding diabase.

The native silver is not only present in association with these gangue minerals, but is common in the diabase forming the wall rock.

It is rather unfortunate that more exact descriptions of some of the veins are not given, for the impression that these statements leave in the minds of the readers is undoubtedly that the veins are more or less simple and homogeneous, being composed of pegmatite (locally known as "Aplite"), which grades off by decrease of feldspar into calcite and quartz. This, however, is quite different from the conditions which are found to prevail on the ground. When pegmatite is present the veins usually have a distinctly composite structure, one side being composed of pegmatite and the other of calcite, with a fairly sharp line of demarcation between them, although instances may possibly occur where this line is not well defined.

In Mr. Hore's article the principal conclusions drawn by him are as follows:—

"The diabase occurs in most cases in the form of large sills, a few hundred feet in thickness, lying nearly horizontal and parallel to the bedding of the Huronian sediments."

"The Cobalt ores have been deposited from solutions which followed the formation of veins of aplite (pegmatite) in the diabase. Owing to the fact that in the silver deposits in the district the silver minerals are intimately associated with cobalt minerals, the silver is believed to have the same origin."

It is also suggested "that the metallic sulphides and arsenides have been concentrated from the diabase magma by extreme differentation."

This last statement is distinctly at variance with the preceding one, which states that the ores were formed subsequent to the pegmatite, the last of the aqueous rocks now seen at the surface to consolidate from the fluid condition. With the exception of the presence of sheets of pegmatite occupying parts of the same fissures with them, the veins are similar to those in the diabase in the vicinity of Cobalt, which have been formed by deposition from aqueous solution. Evidence is entirely lacking to prove that the ores in them have separated out by any process of magmatic segregation from a fluid diabase magma. Any assumption that such is the case is, in my judgment, quite unwarranted.

There can be little doubt but that the fissures in which the silver-bearing veins occur have been caused, as in the Cobalt district itself, by the shrinking of the quartz-diabase or adjoining rock as it cooled and solidified, these fissures being usually normal to the general surface. In some cases they extended to the still molten interior or lower portion of the mass of the quartz-diabase, and allowed this liquid rock to rise up through them, and form narrow dikes.

Thus the dikes were formed after the surrounding diabase had solidified, but while it was still very hot.

As the diabase continued to cool and contract either the fissures in which the dikes of pegmatite had been formed were reopened, or altogether new fissures appeared, and then, and not till then, the mineralizing solutions invaded their fissures and deposited the ores with the calcite gangue, not only in the fissures themselves, but in minute crevices, both in the surrounding quartz-diabese and in the more brittle pegmatite.

It would be better not to speak of these pegmatite (aplite) dikes as "veins," as if they were definite parts of the gangue, the same as calcite and its associated minerals. Nevertheless, the pegmatite would appear to have a distinct significance in defining the positions of the most important fissures, and those which may reasonably be expected to persist to the greatest depths. Thus while it is not directly connected with the origin of the silver ores, any more than the surrounding quartz-diabase itself is so connected, it is an indication of the existence of fissures which extend to considerable depth, and in which ores are likely to be found in greatest quantities.

J. B. TYRRELL.

THE SHALE OIL INDUSTRY OF SCOTLAND.*

R. D. STEUART, F.I.C.

Nature of the Industry.

Shale is mined in much the same manner as coal, and after being broken into small pieces by machinery, is distilled in retorts and gives as products crude oil, ammonia water and fuel gas. The crude oil extracted from a ton of shale varies from 16 to 35 gallons, and the ammonium sulphate 30 to 70 pounds. The refined products of the crude oil are spirit or naptha 4 per cent., burning oil 33 per cent., gas oil 7 per cent., lubricating oil 20 per cent., solid paraffin 10 to 12 per cent.

The manufacture is allied to the great petroleum industry; only, instead of obtaining the crude oil by boring for it and applying pumps where necessary, as in the United States, Russia, and elsewhere, the shale has to be mined at much expense and retorted to procure the crude oil. The rapid and violent method of the retort gives a much coarser crude oil than the gentle age-taking processes of nature used in creating petroleum; so that besides the extra expense in producing the shale oil there is extra difficulty and expense in refining it. Petroleum often requires only one distillation as far as lamp oil is concerned, and after a slight treatment with sulphuric acid and soda it is ready for the market. The burning oil from shale requires three or four distillations and chemical treatments, and the proportions of chemicals required is heavy. One advantage that the repeated distillations give is the opportunity afforded for making better fractionated and more homogeneous products.

In a petroleum refinery the stills, being very large are few and there is not much plant to be seen, the tanks being often under ground. In a Scotch oilworks there are the great benches of shale retorts sometimes over 60 feet high, with the great stacks of numerous series of 3-inch pipes, 30 or 40 feet high for air condensers. There is the 3-story high sulphate of ammonia house, with its high column-stills, the acid saturators for the ammonia, vacuum or other evaporator for the sulphate from the recovered sulphuric acid of the refinery, centrifugal driers, storing bins, grinding mills etc. In the refining department the stills are small and, on account

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of the repeated distillations, very numerous; the washers for vitriol and soda many; there are coolers, refrigerators, filter and hydraulic plate presses for the separation of the heavy oil and solid paraffin; great sweating houses for the paraffin refining; candle works; sulphuric acid making and concentrating; acid-recovery plant; engineers', joiners' and plumbers' shops, etc.—a very large and varied collection of apparatus covering much ground; so that for a comparatively small production there is a very large and expensive plant. A conspicuous feature of oilworks is the great hills of spent shale.

Extent of the Industry.

There are at present only paraffin oil works in Scotland. Three are smaller and produce only crude oil and ammonia. Four are larger and have fully equipped refineries. Two of them have candle works attached. Together they distil more than two and one-half million tons of shale in a year.

In 1906,

	Tons Shale.
West Lothian or Linlithgowshire produced..	1,791,896
Mid-Lothian or Edinburghshire produced....	732,635
Lanarkshire	21,051
Total	2,545,582

In 1906 the refined products were:

Spirit or naptha, sp. gr....680 to .750, about 2 1-2 millions imperial gallons.

Burning oils, sp. gr..... .790 to .830, about 17 millions imperial gallons.

	Tons.
Gas or intermediate oils, .850 to .870 ....about	38,000
Lubricating oils, .965 to .900 .....about	40,000
Solid paraffin wax, m. pts., 100° to 130° F..about	22,500
Sulphate of ammonia, over	50,000
Still coke, selling 60 to 70 shillings a ton	5,000

The total paid up capital of the four refining companies is about one and one-half million pounds sterling. The dividends last year were 5, 15, 15, and 50 per cent.; respectively; for this year 7, 15, 17.5 and 50 per cent.; but many years the dividend for most works was *nil*. The wages paid by the companies are about £700,000 a year. There are 8,300 men employed, including 3,380 miners.

The whole industry is small in comparison with the mineral oil requirements of the country, nevertheless it is large enough to cause the light of the common people to be supplied at less than one-half the price that would have had to be paid if dependent on foreign kerosene only.

Origin of the Industry.

James Young (born 1811) started life assisting his father as a cabinet-maker in Glasgow. He attended lectures on chemistry given by the great Professor Thomas Graham, showed aptitude, and became Graham's assistant for seven years. He followed Graham to London when he was appointed to the professorship at University College. By and by Young became manager for four and one-half years in Muspratt's chemical works, near Liverpool. He afterwards held an appointment for many years in Tennant's chemical works, Manchester. While there he was written to by Professor Lyon Playfair (afterwards Sir Lyon and Lord Playfair) telling him of a spring of petroleum in a coal pit at Alfreton, Derbyshire, which he suggested Young should erect works to refine. Young did so, starting, I suppose, the first petroleum works of present day type. The crude oil was of the consistency of thin treacle, and the quantity about 300 imperial gallons a day; and from it was manufactured illuminating and lubricating oils. Solid paraffin in small quantity was extracted and made into candles. This was in 1848. Within two years the oil began to fail. The mode of its occurrence had suggested to Mr. Young that it had been extracted from the coal by a subterranean low-temperature distillation, and he set himself to make a similar oil artificially. He tried many coals of England and Scotland until he discovered the Torbanehill or Boghead gas coal (see p. 584). This substance gave him the products he wanted. He took out patents for the low-temperature distillation of coal both in Britain and the United States; and in partnership with Mr. Meldrum, who had managed for him at Alfreton, and with Mr. E. W. Binney, of Manchester, the geologist, who supplied the capital, works at Bathgate were started in 1850. During the next ten years works were erected at various places in the United States to distil coal or shale by this method, some with license from Young, and his method of refining by fractional distillation from stills and treatments with sulphuric acid and with soda well known; so that when after 1859 petroleum became plentiful, the method was familiar, and works suitable for its refining were already in existence and at hand. During those years great interest in bitumens and bituminous minerals was being taken in America and all over the world, and many investigators were in the field, and modern works and methods could not have been long delayed, nevertheless James Young stimulated thought in Aemrica, introduced suitable petroleum lamps, and helped at once to give things a right direction; and he has some claim to be considered the father not only of the Scottish paraffin oil manufacture but also of the great petroleum industry of America.

James Young amassed a fortune, which his genius and enterprise deserved; bought estates in several parts of Scotland, among others, Kelly in Renfrewshire on the Frith of Clyde. He recived the honorary degree of LL.D. from St. Andrews University, was an original member of the Chemical Society, and F.R.S. of London. He died in May, 1883. He invented the method of making chlorate of potash, etc. He was a great friend of David Livingstone, the African traveler, who laid the foundation stone of Addiewell works for Dr. Young.

The Minerals Used.

The Torbanehill mineral was used about twelve years in Scotland for paraffin oil manufacture. Some was exported to the continent of Europe and to America for the same purpose. After that time it soon became exhausted. Shale was started early in the sixties and has continued ever since. Gas and parrot coals were also used. Throughout the Coal Measures there were many bands of shale, and often in connection with coal seams. Above the coal seam there was often a thin bed of shale, and under the coal a thin bed of black-band ironstone. Shale seams were worked in the Clyde valley coal fields in connection with the Splint and Virtuewell coals, the mussel-band ironstone, and the Kiltongue coal. In Fife, Midlothian, Lanarkshire, Stirlingshire, Renfrewshire and Ayrshire, shale and bastard parrot coals were worked in the Coal Measures, Millstone Grit, and Mountain Limestone. In the early and bright days of the industry shale or gas coal was worked for oil at various places in the English coal fields also, for instance, in Yorkshire, Cheshire, Lancashire, Staffordshire, and especially Flintshire in North Wales. In Flint the Lees-

wood cannel seam was from fix to six feet thick, of a limited basin-shaped area, and it thinned at the edge: All have been stopped for many years. When American petroleum was imported in large quantity the prices of products fell, the richer cannel coals were used for gas making, and the bastard paraot coals and shales of the Coal Measure, both in England and Scotland ceased to be mined; so that for many years now the manufacture has been confined to the shales of the calciferous sandstone (see p. 587).

Locality of the Industry.

The locality of the industry may be appreciated from the map, Fig. 53.

The middle of the shale fields lies thirteen miles due west of Edinburgh. It is a strip of country five to eight miles wide, stretching from the shores of the Firth of Forth north of this point southward for sixteen miles. It passes through the counties of West Lothian and Mid Lothian and ends within the borders of Lanarkshire, near the western termination of the Pentland Hills. It contains the shale-working districts of Dalmeny, Philpstoun, Winchburgh, Uphall, Broxham, Mid-Calder, West Calder and Tarbrax. The accompanying map shows the



FIG. 53. Map of the south of Scotland, with calciferous sandstone shown darkened and the shale field black.

location of the district and also of the areas of the calciferous. Oil shale beds are found, although not at present worked, in a narrower strip farther east, and not long ago there was an oil work on it near the village of Pentland. A limited continuation of this band is found beyond the Forth in Fife at Burntisland and here also an oil works was in operation fifteen years ago or so. These districts may yield some oil shale in the future. The accompanying section, Fig. 62, page 594, shows the structure of the West Calder shale field. A series of columnar sections at different points is given in Fig. 54, page 579.

History.

The first oil work starting in 1850, there were about 6 in 1860, 90 in 1870, 26 in 1880, 14 in 1890, 9 in 1900, 7 in 1908.

The first government statistics of shale were taken in 1873, 23 years after the start of the manufacture. We give the annual output in Scotland, and, for the sake of space, selecting only every tenth year, for comparison.

1873	524,095	tons shale
1883	1,130,729	tons shale
1893	1,947,842	tons shale
1903	2,009,265	tons shale

Although the number of works was reduced the total production was kept up.

Soon after 1860 American petroleum was imported in large and increasing quantities. At first only lamp oil was imported and the Scots modified their retorts and heats to get a larger proportion of the heavier products. They bought petroleum residuum from America to refine into lubricating oils. Soon the Americans took up the refining of heavy oils for themselves and flooded Britain with it also, and the Scots improved their freezing plant to get more solid paraffin. Soon also solid paraffin was imported in large quantities, and now the retorts were lengthened and suited for increasing the production of sulphate of ammonia. Peruvian guano had long been used by the British farmer as an important source of combined nitrogen. By 1880 it began to become exhausted and the price of sulphate of ammonia rose as high as £24 a ton. This put new life into the industry followed by over-production; also the increased import

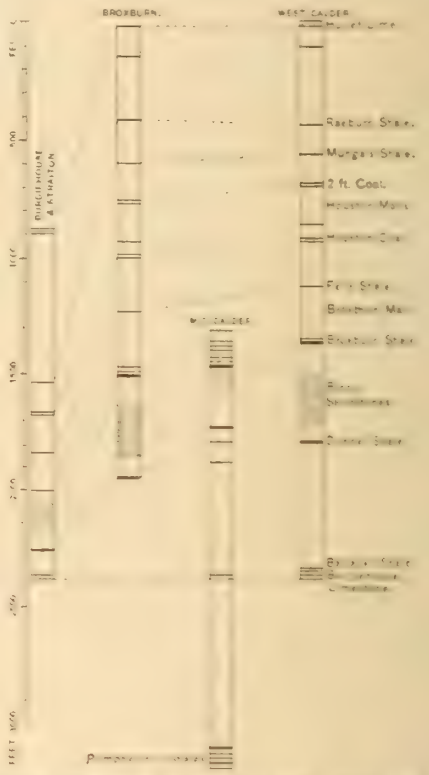


FIG. 54. General section of the West Calder shale field and carboniferous limestone series to the west. (After H. M. Caddel, *Geology of the Oil Shale Fields of the Lothians.*)

of nitrate of soda had by 1890 lowered in large quantities by iron works, coke ovens, Mond gas producers, etc., besides combined nitrogen being made from the atmosphere by electrical means, and although America has harnessed Niagara for that purpose, nevertheless, on account of the increasing demands for nitrogenous fertilizers the price of sulphate has for some years kept up to £12 a ton. There has been keen competition also in later years with petroleum products from Russion and Roumania, and solid paraffin from Galicia. The Scottish industry still manages to exist and some companies to pay a handsome dividend. The price of burning oil during the fourteen years of Young's patent was about two shillings and sixpence a gallon; for many years now the price has been about sixpence.

This history of this war of competition records many defeats, many casualties. Every new move of the competitors swept many oil works out of existence. Every

new step forward in retorting or refining would bring a temporary hopefulness and new works would start, soon again to be stopped. During the 57 years of the existence of the industry 120 different works have been thus started and stopped, some without ever paying a dividend. Much capital has thus been permanently lost. The companies that have kept in existence have succeeded in doing so by improving methods and plant, but principally by increase of size enabling them to cheapen production by concentration.

Retorting and Refining.

There has been great variety in the form of retort and of condenser tried by the numerous works. The first retort used by James Young was a horizontal one of cast iron, of the shape and size then used for gas-making (see Fig. 55). Horizontal retorts were used by others in many sizes and shapes; but Young very soon adopted a small vertical retort of circular section, which was luted into a water trough below, from which the spent shale was drawn in small quantity every hour (see Fig. 56). By and by it was fitted with a bell hopper on top, which was charged every hour, alternately with the drawing every half hour. Soon also steam was injected at the bottom and found to be a great improvement both for quantity and quality of the crude oil. Several retorts were heated by one coal fire and, being dependent on the care of men, they were often over-

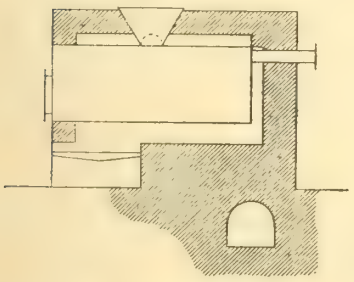


FIG. 55. Horizontal retort.

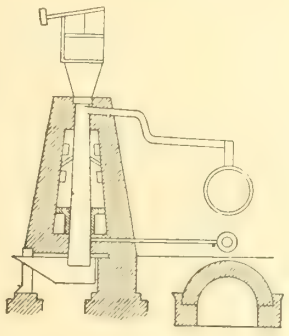


FIG. 56 Old vertical retort.

heated, which spoiled the crude oil and destroyed the retort. The distillation was upwards. The steam helped to diffuse the heat through the mass of shale and to sweep the oil vapors rapidly out of the heat, where the valuable solid paraffin and heavy oil tend to deposit carbon and become decomposed into lighter products. The vertical retorts were increased in size, and oval and other forms were adopted. Some were tried with internal combustion and limited inlet of air but were not successful. William Young tried a double casing, ensuring the gentle heat best for a good crude oil, producing heavy products, solid paraffin and decreased loss in refining. It showed how much could be done in improving the crude oil, but otherwise was a failure.

In 1873 N. M. Henderson invented a retort which, besides giving with precision the gentle heat wanted, also used the spent shale as fuel and thereby reduced the cost of manufacture. Four retorts were erected in one oven over the one furnace; and the spent shale, with its 12 per cent. of fixed carbon, was dropped from each in succession at four-hour intervals and supplied with a limited amount of air; each retort being emptied and recharged every sixteen hours. Steam was superheated in pipes placed in the retort ovens, and the incondensable gases of the distillation were burned in the oven. The very best crude oil was made by this retort, and the ammonia was also slightly increased.

The modern type of retort was the invention of Geo. T. Beilby and and William Young, in 1881. By it the ammonia was doubled or more, and much fuel gas was produced. Four metal retorts were connected with a large hopper above (see Fig. 57) common to the four. The distillation was upwards through the cold shale of the hopper where the crude oil was condensed and redistilled. Each retort had an iron upper part where the oil was distilled from the shale at a low temperature.



FIG. 57. Young and Beilby retort.

The shale was passed down through the lower part made of firebrick, where it was subjected to as high a temperature as possible without fusing, and acted on by steam. The nitrogen was partly converted into ammonia, and the carbon into producer gas. At intervals in the bench of retorts there was one for coal to act as a gas producer to supplement the retort gas, and the ammonia from it was also saved.

The retorts now in operation are on the Young and Beilby principle. I may mention as examples the Bryson retort (see Fig. 58) and the Henderson retort (see Fig. 59). The Bryson is of circular cross-section, the Henderson oblong. Both are continuous working. In the Bryson there is a table below to support the column of shale, with a revolving arm to take the spent shale from the table and keep up the slow movement downwards. In the Henderson the same result is brought about by the slow motion of two toothed drums. Henderson increased the length greatly, and, with an ordinary shalefi the retort makes more gas than it requires for its own use. From ground level to top of hopper is 63 feet, and 15 tons of shale are in a retort at a time. The metal part of retort is 14 feet long and 2 feet 9 inches by 1 foot 3 inches at the top. The brick part is 20 feet long and 4 feet 8 inches by 1 foot 10 inches at bottom. The throughput per day is four to four and one-half tons of shale.

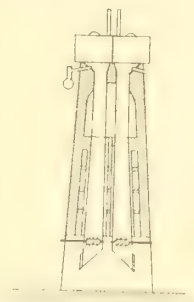
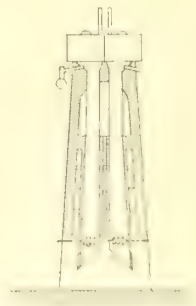


FIG. 58 Bryson retort



The distillation of the ammonia water is much the same as in large gas works. A large works may turn out thirty tons of sulphate of ammonia per day.

The refining consists of distillations and treatments. The distillations separate the various products from each other by boiling at different temperatures; and the continuous-working, connected-still system of N M. Hen-

derson is in general use. The chemicals used in the treatments are oil of vitriol which separates a black tar, and caustic soda which also separates a black tar. Distillations and treatments are repeated several times. The amount of oil of vitriol used is about three to four per cent. by volume on the crude oil.

The heavier oils are first cooled naturally and further by freezing machine, and the solid paraffin separated by filter presses, and, generally, further pressed by hydraulic machinery. Both types of ammonia freezing machine are in use, viz., condensed gas and solution. The solid paraffin is refined by sweating, and Henderson's patented method is in use in all the refineries. A little is refined by naptha pressure. A treatment with cyanide char and filtering through paper is the finishing process.

The cost of mining of the shale varies very much according to the circumstances from 3 to 6 s. per ton. The retorting of the shale costs 1/6 to 2/ per ton. The refining of the crude oil costs ¾ d. per gallon of crude oil. The lordship charged by the proprietor of the soil is 3 d. to 10 d. per ton of shale. The stirring tanks for the chemicals do not attain the magnificent sizes of the American refineries, the largest being about 40,000 gallons.

Geology.

The Torbanehill or Boghead Mineral.

This was the first mineral used by Young, Meldrum, and Bingey. It was found in a small basin a little to the southwest of Bathgate, two or three miles in diameter; and nowhere else in the United Kingdom.

It may be described as consisting of 20 to 30 per cent. of clay mixed with 70 to 80 per cent. of carbonaceous matter. This is insoluble in benzene, turpentine, carbon bisulphide or petroleum spirit, and is therefore not of the nature of petroleum or bitumen, although it gives petroleumlike products by destructive distillation at 700° or 800° F. The mass of carbonaceous matter seems without structure, and the fossils were found throughout the bed and not merely on the surfaces of seams, as is general with coal. It contained impressions of *Sigillaria* and *Stigmaria,* and the few inches of fire clay below it contained *Stigmaria,* the *Sigillaria* sometimes proceeding upwards through the torbanite in its natural position when living. There are no fish remains, although these are generally found in Scotch cannel coals. The microscope sometimes showed the scalariform tissue of tree ferns, also the spores of ferns in clusters. Torbanite is no doubt the remains of organic matter in its original position and not a product of distillation, as some have suggested; a distillate would have been soluble in petroleum spirit. Renault considers both torbanite and oil shale to be mainly alteration products of masses of gelatinous fresh-water algae from which oxygen has been eliminated, and containing immense numbers of bacteria, especially micrococri. In cannel coals the prevailing vegetable constituents are spores of cryptogamic plants, algae being rare and in many cases absent.

The Torbanehill mineral is of a brown or nearly black color; there were brown and black varieties, and the brown was the richer. It had a yellow or fawn-colored streak without lustre, and subconchoidal fracture, was amorphous, and apparently homogeneous when fresh, but showed distinct stratification when spent in the retort. It was very indestructible and did not deteriorate with weathering. Near basalt dykes it became soft, sticky, and brown, resembling melted india-rubber. In the laboratory it takes fire readily when put to a flame, splits, does not fuse, burns with a very smoky flame, giving an empyreumatic odor, and leaving a considerable amount of white ash.

The crude oil taken from it was 90 to 130 gallons per ton; sp. gr. about .890. It was richer in the east part of the field than the west, and it deteriorated somewhat with depth. It yielded 44 to 48 per cent. of crude oil and 1 to 1½ per cent. of solid paraffin. It has been analyzed by many chemists.

Heated in a close crucible the mineral gave (Dr. Fyfe):

> 67 to 70 per cent. volatile hydrocarbons, 6.6 to 16.3 per cent. fixed carbon, and 12.8 to 23.2 per cent. ash.

The following analysis is by Anderson:

Carbon	64.02
Hydrogen	8.90
Nitrogen	0.55
Sulphur	0.50
Oxygen	5.66
Ash	20.32
Total	99.95
Ash: Silica	56.09
Alumina	40.04
Peroxide of iron	3.24
Lime	0.34
Magnesia	0.46
Total	100.17

The sp. gr. varied from 1.17 to 1.316.

It differs from coal in having a larger proportion of hydrogen and in not leaving a coke on distillation. In ordinary gas coal the proportion of carbon to hydrogen is 100 to 10; with Torbanehill mineral 100 to 14. The geological position was near the base of the coal measures overlying the Millstone Grit.

The seam varies from one inch to thirty inches in thickness. There were vertical joints that cut it into irregular cubes. In a pit at Torbane the section was as follows:

	Feet	Inches
Boghead house-coal	2	7
Arenaceous shale	6	0
Shaly sandstone	0	7
Shale and ironstone containing remains of plants and shells	0	10
Cement stone (impure limestone)	0	4
Boghead cannel	1	9
Fireclay full of stigmariae	0	3

Then came six inches of common coal, and a series of thin seams, one inch or less of black shale, coal, shale, coal, fire clay, etc. The roof above the cement stone contained remains of calamities; the iron nodules, fossil shells of genus *Unio* (E. W. Binney).

The Oil Shale.

Good typical shale is of black or brownish color, fine in the grain and free from grit. It is distinguished by its brown streak, and its resistance to disintegration by weathering. It is tough and sometimes flexible. Under the knife the thin shavings turn up and curl over. Poor shale or "blaes" is friable under the same test and exposed to the weather soon breaks up into small fragments, and before long crumbles into clay. The richer

shales are nearly black but they are found in all gradations of color through brown to gray, as they decrease in quality. They are made up of fine laminae which become apparent when exhausted of organic matter by distillation. Some shale is "plain," that is, the laminae are parallel with the stratification of the seam. Other shale is "curly," and the layers, as if by side pressure, are crushed into wave-shaped, curled, irregular masses, with black brightly polished surfaces. There are often plain and curly layers in the one seam, one layer having remained rigid while the other slid and folded itself in the places of reduced pressure.

Although generally called bituminous shale, it is free from bitumen, having practically nothing soluble in ether or petroleum spirit. The carbonaceous matter present is also different from coal. Ordinary coals, by low-temperature distillation, give about 25 to 30 gallons per ton of liquid distillate, which is not a crude oil but a coal-tar, and has a specific gravity of over 1.00; and sulphate of ammonia about 20 lbs. to the ton. The high-specific gravity of the tar arises from the large proportion of ringed compounds of the benzene type, etc. In the crude oil of shale the specific gravity is .860 to .880 generally, and itis largely composed of the paraffin or chain series of compounds. There are many shales in the shale measures. The higher ones give a larger yield of crude oil, of higher specific gravity, larger loss in refining and less solid paraffin, and less ammonia. The shales and bastard parrot coals that used to be worked in the higher stratigraphical levels of the coal measures, had still higher specific gravity as of more of the nature of coal, with sp. gr. up to .930 or even .950.

Broxburn seam shale, which may be taken as an example, by ignition in a closed crucible, gave

	Per Cent.
Volatile matter	25.5
Fixed matter	74.5

In the fixed matter 4.95 was carbon, and 69.55 per cent. ash. The ultimate composition of Broxburn seam shale, dried, was

	Per Cent.
Carbon	19.12
Hydrogen	2.94
Nitrogen	0.54

Mills gives the composition of the ash of good average shale as

Soluble in water (containing SO_3 0.92 per cent.)	8.27
Silica	55.60
Ferric oxide	12.23
Alumina	22.14
Lime	1.55
Magnesia	trace
Sulphur	0.94
Total	100.73

Total sulphur in the shale 1.80 per cent. Total sulphur in the ash 1.31 per cent.

Shales from other parts of the world may be rich in oil although coarse-grained, gritty, and not curling under the knife.

As an example of shale from the coal measures, the Leeswood seam of Flintshire may be given. Five to six feet were worked.

Upper portion, smooth cannel 25 to 30 inches thick, gave 16 per cent. of crude oil of .925 to .940 sp. gr.

Then curly cannel, 18 inches, giving 30 per cent. crude oil; sp. gr. .875 to .890.

Then shale or bastard cannel 14 to 24 inches, 12 to 15 per cent. crude oil; sp. gr. .900. In some places this shale was replaced by common bituminous coal, and adhering to the cannel above gave a distillate containing the benzene and naphthalene series of compounds as in coal-tar, and spoiled the burning of the lamp oil.

The calciferous sandstone series of the Lothians contains over twenty different seams that have been or are capable of being worked. The ones lying on the higher stratigraphical level may yield as much as 45 gallons crude oil to the ton, the lower ones less, the lowest about 16 gallons. With ammonia it is the reverse, the upper ones least, 20 pounds or so, the lower ones most, 50 to 70 lbs. to the ton. The gradual change in the nature of the seams as they get deeper may partly arise from the greater age of the deeper ones, combined with the higher temeperature to which they have been subjected. There are many seams of igneous rock intruded among the

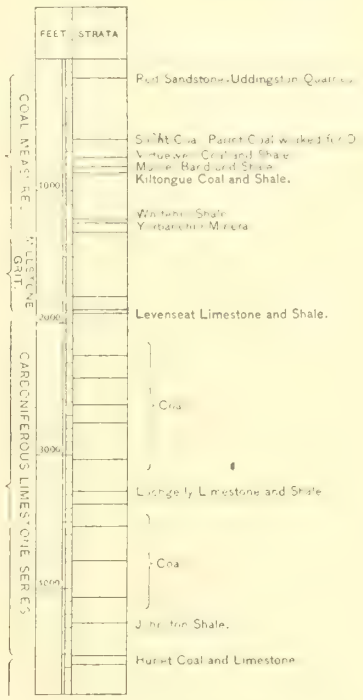


FIG. 60. Generalized columnar section of the shale fields of Mid and West Lothian.

shales, and the heat of these would help to cook the deeper ones to gentle decomposition; for what we have in the shales is the residue of a gentle, age-taking decomposition of organic matter giving results something like destructive distillation. The resulting gases have sometimes escaped; but with an impervious roof they accumulated under pressure and escape when a bore is sunk into the strata. Shale subjected to heat in a covered vessel at about 600° F. or 300° C. distills off almost all the carbon and hydrogen but leaves behind 63 per cent. of the nitrogen (Beilby). Coal at 300° C. in a closed vessel loses a considerable weight but none at all of the nitrogen (Carrick Anderson). So that age, along with the increased but still mild temperature of the greater depths, goes a long way to account for the decreased yield of crude oil but increased yield of ammonia for the deeper shales. The higher shales tend to give a crude oil of higher specific gravity than the lower ones, with less solid paraffin, and this partly arises from age and heat also; but not altogether. Sometimes within a

few feet of each other, as in the Leeswood shale before mentioned, there are seams, one of which gives a high, the other a low, gravity of crude oil, from a difference in the original materials deposited—a difference in the proportion of coal-giving materials. A seam of shale, good near the outcrop, often deteriorates as to quantity of oil as it dips deeper under superincumbent strata.

Entomostraca are common in many shales together with fish and plant remains. Animal matter may sometimes add to the proportion of ammonia extracted from shale.

The Calciferous Sandstone.

This is the lowest division of the carboniferous system. Its distribution is shown on the map, Fig. 53, It comes under the Carboniferous Limestone and rests comfortably on the upper Old Red Sandstone. There is a triangle of this formation in the Lothians bounded on the north by the Frith of Forth, on the west by the Bathgate Hills, and on the southeast by the Pentland range of hills. An anticlinal fold or arch coincides with the general line of the Pentlands, and the Lower Old Red Sandstone and Upper Silurian are brought to the surface. Denudation has removed all the carboniferous rocks from the Pentland Hills just as in the calciferous sandstone district all the higher divisions of the carboniferous system have also been ground off. The country north of the Pentlands would have been reduced to an approximately level plain had it not been diversified by masses of intrusive igenous rock which here and there have produced little hills with the ordinary crag and tail form due to glacial erosion, the crag towards the west and tail towards the east. These relations are illustrated in the section, Fig. 62.

The calciferous sandstone of Scotland consists of two subdivisions: (1) A lower one, the cement stone series or Ballagan beds, varying in thickness from less than a hundred to several thousand feet, made up of alternations of thin clayey limestone or cement stone bands, thin micaceous sandstones, shales and mud stones, but no oil shales. They are evidently lagoon deposits. These crop out towards the east, and a large part of Edinburgh is built upon them. (2) A higher one, the oil shale series, over 3,000 feet thick, which contains the many good shales, and crops out toward the west and forms the good shale country already mentioned, stretching from the Frith of Forth to the southwest end of the Pentlands. There are in it white, red and yellow sandstones, blue, gray, green and red marls or clays, blue and black shales, thin coals, fire-clays and estuarine limestones. The sandstones are of great importance for building stone, a considerable proportion of Edinburgh and other towns being built from them. The limestones also are of great economic importance, and besides serving for mortar and for agricultural purposes, have supplied vast quantities of limestone for the iron furnaces of the west of Scotland. The seams of limestone afford great assistance in defining the positions. The richest oil seams of shale lie between the Hurlet limestone which is the upper limit of the oil shale sub-formation, and the Burdiehouse limestone which for long was considered the lower limit; but 800 feet below this position the Pumpherston shales occur. Both Hurlet and Burdiehouse are well known and easily recognized; and certain thin seams of limestone, although of little value economically, are so persistent over the field that they are good guides to the borer in determining his exact position.

One significant feature of the district in connection with the history of the oil shales is the abundant development of igneous rocks. There are beds of volcanic tuff lying interstratified with the sedimentary strata over considerable areas and in definite positions. There are volcanic necks in seven or eight localities; and sheets of dolorite that cover great areas, one in particular. It has preferred to intrude itself into the position of some good shale or other, not always keeping to the same horizon, however, and at some places itself splitting into several distinct sheets. Over a large area this sheet will only average a few feet, but at certain places it swells out in laccolitic fashion to 80 feet or more. These sheets have generally been intruded when the sediments were

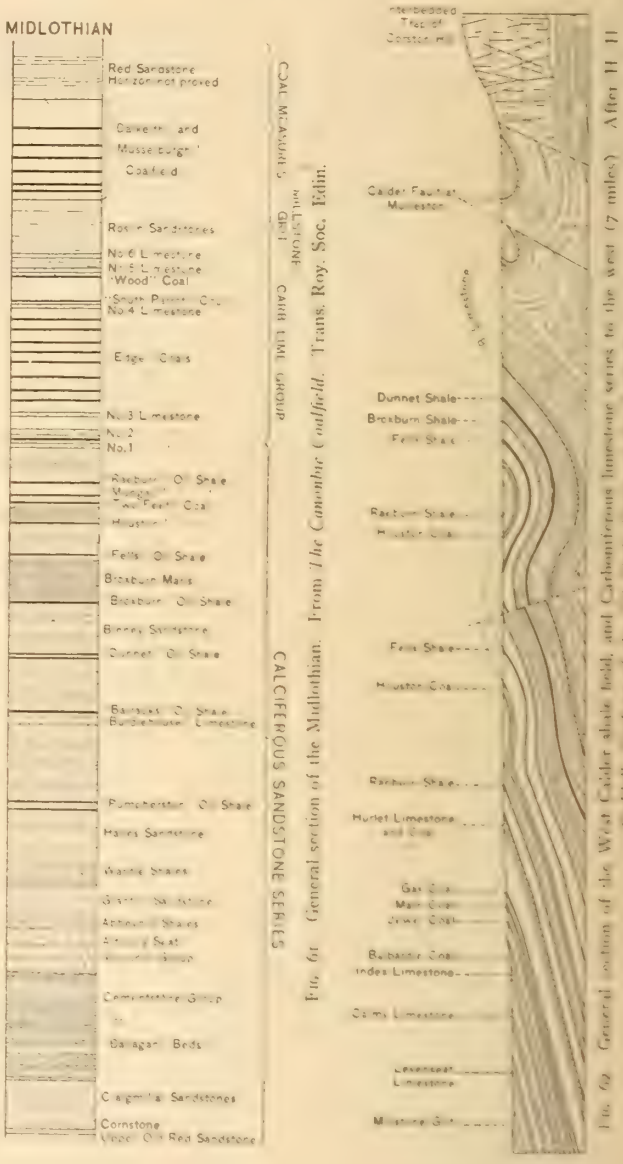


Fig. 61. General section of the Midlothian. From *The Carboniferous Coalfield*. Trans. Roy. Soc. Edin.

Fig. 62. General section of the West Calder shale field, and Carboniferous limestone series to the west (7 miles). After H. H. Cadell, *Geology of the Oil Shale Fields of the Lothians*

comparatively level. Since then the strata and sill together have been wrinkled into great waves, a succession of synclines and anticlines, and these have a general trend north and south. There are four great faults across the shale field with the same general direction—east to west at first and sweeping down to southwest or south. The displacement is often 1,000 feet, sometimes nearly 2,000 feet. The down-throw is to the north except in the most northerly. There are many smaller faults and many branches to these. At one place a dyke of igneous rock 100 feet wide has destroyed the shale for 70 feet on each side of it. There was no gas in the

burned shale; but on mining a road through the basalt dyke it was found to be itself charged with inflammable gas under considerable pressure. There was also a spring of brine. The distillation products had been permanent gas. Where, in another place, the sill 5 feet or so thick had taken the place of a shale and destroyed it, there were cavities in the sill partly filled with a yellowish semi-solid hydrocarbon, something like vaseline, and the cavities were lined with crystals of calcite, or, rarely, with barite. The hydrocarbon had the composition, carbon 84.35 per cent., hydrogen 12.83 per cent., nitrogen 1.68 per cent., trace of sulphur (R. Tervet). No doubt the hydrocarbon was the product of distillation of the shale and the temperature of the sill had not been high enough to convert all permanent gas. There was no outlet for the vapors and they had to make room for themselves in the molten trap. Another good seam of shale lying only 8 feet below the sill was not in the least harmed; another proof of comparatively low temperature. The strata at the time would probably be under water and water-logged, which would help to keep down the temperature, and also shut in the vapors. Often the shale comes close to the igneous rock and is quite good until it practically touches. Sometimes, however, the temperature has been destroyed for a good many fathoms both above and below.

The calciferous sandstone towards the west dips under the coal measures. When it rises again to the surface farther west at the other side of the coal basin, there is no sign of shale. It dips also under the edge coal to the east, and when it comes to the surface again beyond the coal field the shales have either disappeared entirely or become so attenuated as to be not worth working. The calciferous sandstone covers a large area in other parts of Scotlandd; but altogether without oil shale, or with a mere suggestion. So the circumstances suitable for deposits of oil shale seem to have been confined to this limited locality.

The strata of the oil shale field being wrinkled into numerous waves as described, the result of the folding and also of the faulting is to bring again and again the same seams to within working distance of the surface over a considerable area. Instead of having one clean strike north and south the outcrop of the shales forms a wide-stretching network. In searching for shale in a new locality many bores have to be put down, and trial pits, to make certain the shale is sufficiently extensive to be worth the expense of a mine or pit shaft, otherwise faults or intrusive whin may render the whole undertaking fruitless. There is boulder clay over most of the field, sometimes more than 200 feet deep, and this conceals theh indications that might be expected on the surface; and often there is little information to be gleaned from stream sections.

Boring to 100 fathoms costs about £300, to 200 fathoms about £800 or £1,000. Sinking a mine costs £15 to £30 a fathom. These all vary much at different times and according to the circumstances.

General Section of the Shale Districts.

The Hurlet limestone and coal is the upper limit of the shale subformation.

Strata. 450 ft. at West Calder, 400 ft. at Broxburn, etc., consisting of blaes, ironstone ribs, black-band ironstone, pebbly sandstone, etc.

Raeburn Shale. 3 to 6 ft. thick, giving 40 to 55 gallons of crude oil to the ton and 14 lbs. sulphate of ammonia. Worked in limited areas towards the southwest. In the south Cobbinshaw field there is another shale about 100 ft. above the Raeburn.

Strata. 140 ft. at West Calder, 190 ft. at Broxburn; blaes fire-clay, sandy blaes, ironstone bands, etc.

Mungle Shale. 2 ft. 35 gallons crude oil, and 30 lbs. sulphate of ammonia. Not much worked.

Strata. 130 to 190 ft.; chiefly blaes with fire-clay and iron-stone bands.

Two-feet Coal. 1 to 3 ft. Varies from cannel coal in one district to smithy coal in another. Worked a little at one time at Broxburn along with a thin shale and an ironstone. Immediately above the two-feet coal in some districts are interbedded volcanic tuffs.

Strata. Houston Marls. 230 ft. They are green or reddish, massive, amorphous, mudstone-like beds, hard when fresh but crumble down when exposed. I nbeds of a yard or two in thickness separated by thin bands of a harder and more permanent nature; homogeneous and structureless within the limits of the bed. Unfossiliferous. It has been suggested as accumulation of volcanic dust, but it contains much less silica than the most basic of volcanic rocks. Silica 35 to 40 per cent., ferrous oxide about 3 per cent., ferric oxide 6 per cent., alumina 20 to 22 per cent., lime about 11 per cent., carbonic acid 11 per cent., etc., deposited in water during a long cessation of oil-shale-making conditions.

Gray Shale of Addiwell. Less than 2 ft. generally. Not much worked. Composed largely of entomostraca, "squeezed together like grains of linseed in oil-cake."

Strata. 60 ft.; blaes, fire-clay, etc.

Houston Coal. 4 to 6 ft. The lowest coal that has been worked to any great extent in Scotland. It lies 2,000 ft. lower than the lowest workable seam of the carboniferous limestone. It is an inferior coal, pyritous, and with blaes interbedded. It had been much worked at the outcrops in very early times, but is not worked now.

Strata. 150 to 250 ft. thick. The principal shale of the West Calder district Extensively worked all over the shade district. 26 to 40 gallons crude oil and 20 to 35 lbs. sulphate of ammonia.

Strata 150 to 250 ft. thick. Extensively worked all over the shale district. 26 to 40 gallons crude oil and 20 to 35 lbs. sulphate of ammonia.

Strat. Broxburn Marl. 135 to 270 rt. Imemediately under the Fell's shale there is limestone 3 to 5 ft. thick, that the borer looks for as proof that the shale is Fell's . Then come greenish, marly or ashy clays with very hard cement stone from 1 inch to a yard in thickness Therè are no sandstones.

At Oakbank 12 ft. above the Broxburn seam there is—

The Big Shale, 4½ ft., 22 gallons, and 13 feet higher still
The Wee Shale, 1½ ft., 36 gallons. These are generally wanting elsewhere.

Broxburn Shale. This has always been an inferior shale in the West Calder district, 4 to 6 ft.; but it is the principal shale at Broxburn, Oakbank and other localities. At Broxburn there are three seams:

The Broxburn Gray, about 6 ft., 23 gallons 35 lbs.

The Broxburn Curly, 5½ ft., 26 gallons, 38 lbs.

The Broxburn, 5 to 6 ft., 28 to 35 gallons, 40 lbs.

At Oakbank, where these three seame are found along with the two extra ones above, 16 ft. under the Broxburn seam there is another shale of 4 ft.. the Wild Shale.

Strata. 400 to 500 ft.; blaes and marl on top and then the Binny Sandstone, thick massive beds which have been extensively worked for building stone throughout the district. Blaes and marl below.

Dunnet Shale. 4 to 12 ft. 24 to 333 gallons crude oil and 24 lbs. sulphate of ammonia. The principal shale at Pentland, Duddingstone and Burntisland, and extensively worked in other districts.

Strata, 400 to 600 ft. Sandstone, blaes, and limeribs, 10 fathoms below the Dunnet seam at Broxburn there is a stratum saturated with petroleum and brine.

Barracks Shale. Sometimes 8 ft. thick and yielding 22 gallons per ton, but generally thinner and poorer in oil.

Strata. 40 ft. blaes. Sometimes only 5 ft.

Burdiehouse limestone. Soemtimes as much as 64 ft. thick and both quarried and mined. Extensively worked throughout the region. Burned for local use for building and other purposes, and sent off in great quantities to the iron works of the west of Scotland. A fresh-water or estuarine limestone, with numerous fossil fishes, and distinguished by the abundant remains of a small ostracod crustacean *Leperditia Okeni* var. *Scotoburdigalensis*. It often rests upon a characteristic pavement called the "Buckie fake," containing the small gasteropod *Platyostomella Scotoburdigalensis*. Some places this limestone is only 10 ft. thick or less.

Strata. 678 ft. at Broxburn. Blaes with thick sandstones in the centre.

Pumpherston Shales.

No. 1, or Jubilee Seam. 8 ft. 18 gallons crude oil, 55 sulphate of ammonia.
Strata Blaes, 14 ft.
No. 2, or Maybrick Seam. 5 ft. 16 gallons crue oil, 60 lbs. sulphate of ammonia.
Strata. Blaes and ribs, 13 ft.
No. 3, or Curly Seam. 6 ft. 20 gallons crue oil, 60 lbs. sulphate of ammonia.
Strata. Fakes, blaes, 12 ft.
No. 4, or Plain Seam. 7 ft. 20 gallons crude oil, 60 lbs. sulphate of ammonia.
Strata. Blaes, etc., 12 ft.
No. 5, or Wee Seam. 4 ft. 18 gallons crude oil, 60 lbs sulphate of ammonia

Bibliography.

A full account of the geology of the shale fields may be found in the "Memoirs of the Geological Survey of Britain: The Oil Shales of the Lothians," 1906 Also "The Oil-shale Fields of the Lothians," by H. M. Caddell of Grange, in Trans. Inst. Min. Eng., 1901, or Trans. Edin. Geol. Soc., VIII., p. 116.

The history of the development of the retort is given by Dr. George T. Beilby, F.R.S., in Jour. of Soc. of Chem,, 1897, p. 876. Refining is described in same journal, 1889, p. 100.

PERSONAL.

Mr. J. J. Drummond has returned to Midland, Ont.

Mr. A. C. Flummerfelt, of Victoria, B.C., has been visiting Montreal on business.

Mr. K. Hasekawa, a mining engineer from Japan, who represents the Furnkawa Mining Co., is in the Boundary (B.C.) district visiting various mines.

Mr. A. A. Hassan, of Cobalt, is in Toronto. While engaged by the Victoria Mining Company, Mr. Hasson uncovered several veins on that property.

Mr. T. J. Drummond, president of the Canada Iron Corporation, Limited, has returned to Montreal after a tour through Nova Scotia and New Brunswick.

Mr. Elijah Heathcote, late inspector of mines in the Province of Alberta, has been appointed superintendent of the collieries of the Crow's Nest Pass Coal Company at Coal Creek. Mr. Heathcote was in the employ of the company some years ago at the Carbonado Colliery.

Mr. Jos. L. Danziger, B.S., formerly of the Department Chemistry, Columbia University, has been appointed manager of the Canadian Behrend Dry Concentrator Co. and will have full charge of the Technical Department of the Company. Mr. Danziger is a man of recognized ability in his profession, and has made a specialty of concentration of ores, metallurgy, and industrial chemistry. His recent work in Cananea, Mexico, and at the Lake Superior copper field, perfecting systems of concentration of low-grade ores and mill tailings, was very successful. Mr. Danziger is a firm believer in the principle involved in the Behrend System of dry concentration, based upon familiarity with its operation on many ores, during the past six months, which, with laboratory testing work on Cobalt and other ores of Canada, eminently fits him for economic work in the field of the Company's operations.

Under the present United States tariff the duty on the principal metallic ores is as follows:

Antimony ores	free
Cobalt ores	free
Copper ores	free
Gold ores	free
Nickel ores	free
Silver ores [illegible]	free
Tin ores	free
Zinc ores	free
Lead ores (on lead contents)	1½c. per lb.

The Dannert gas, the new German illuminant for small towns, is made from oil and coke, and is much cheaper than water gas, which it somewhat resembles. The coke used in its production is less than a third of that consumed for a like amount of coal gas. The new gas yields a bright flame, and, as there are no by-products, the process of manufacture is simple.

BROMO-CYANIDING OF GOLD ORES.

In Volume XII. of the Transactions of the Australasian Institute of Mining Engineers there is an interesting paper on bromo-cyaniding of gold ores, by Mr. E. W. Nardin.

At the Hannan's Star mine the process was installed and the plant erected by the London-Hamburg Company. An extraction of 91 per cent. was guaranteed on sulphide ore carrying 15 dwt. of gold. The new features in the process are fine grinding by means of tube-mills, and the addition of bromo-cyanide solution to the vats under ordinary cyanide treatment. The difficulty of obtaining bromo-cyanide solution at reasonable cost was met by the London-Hamburg Company, who supply the mixed salts at a very satisfactory price.

Most of the treated ore was low-grade; hence the percentage extraction appears to be low. But the average value of residues for 1904 and 1905 were 1 dwt. 2 grs. and 1 dwt., respectively, on ore averaging 10 dwts 7 grs. and 8 dwt. 9 grs., respectively. On high grade ore the process was equally successful. In 1903, 15,000 tons of ore from the Brown Hill Extended mine, carrying 4 ozs. gold per ton, and containing telluride, were treated. The average extraction was 95 per cent.

The average cost for bromo-cyanide Hannan's Star sulphide ore was 9.75 pence per ton of ore treated, a saving of 2 shillings per ton as compared with roasting.

The process followed at the Hannan's Star plant in July, 1904, at the time Mr. Nardin took charge, was modified later. At that time the ore from the breaker was dry-crushed in two No. 5 Krupp ball mills, fitted with steel wire screens of 27 holes to the linear inch. From the mills it passed to a mixer, over amalgamated plates, and to a classifier at the end of the tube mill where the slimes overflowed to the slimes pump, and the underflow went to the tube mill. The tube mill discharge was elevated back to the classifier and again separation. The slimes pump delivered to two sets of spitz-luten, the underflows from which passed back to the tube mill, and the overflows to the pointed settling boxes, where the pulp was thickened before passing to the agitator vats. The object was to slime all the ore to pass a sieve of 150 holes to the linear inch. In practice about 5 per cent. would remain on the 150 sieve, but the whole of it would pass through the 100.

There were four agitator vats of 50 tons dry ore capacity each. Each took about 16 hours to fill, representing 75 tons of ore per day through the ball mills. A mechanical sampler arranged between the ball mills and the mixer, cut out a definite quantity of ore periodically. This gave the day's sample.

A vat, when full, was given its charge of KCN. Three hours afterwards a "dip" KCN residue sample was taken and the charge of Br CN solution added. After agitation for 20 hours, lime was added and the vat "pressed." The quantity of Br CN to be added varied according to the residues of preceding vats and the value of the ore being treated.

Every sixth frame in a filter press was sampled, and the bulk sample from the whole vat quartered down to represent the final residue of that vat. The KCN residue was washed on a small vacuum filter and assayed after drying. From the daily ore samples, KCN, and final residues, the total extraction and extraction by plain KCN and by Br CN were determined.

The bromo-cyanide solution is made according to the following equation:—

$$2KBr + KBrO_3 + 3KCN + 3H_2SO_4 = 3BrCN + 3K_2SO_4 + 3H_2O$$

Its action upon the ore is supposed to be as follows:—

$$BrCN + 3KCN + 2Au = 2KAu(CN)_2 + KBr$$

The mixed salt as obtained from the London-Hamburg Company contained:—

40% to 44% of Br as K Br
20% to 22% of Br as $KBrO_3$

A 30-lb. working charge is usually made up thus:—

H_2SO_4	50 lb.
KCN	20 lb.
Mixed salts	36.8 lb.

The KCN is 93% material, and the H_2SO_4 63 per cent. (chamber acid). The solution is made in a closed wooden vesel, fitted with rotating arms and holding 200 gallons. The H_2SO_4 is mixed with a portion of the water first and allowed to cool. The KCN, dissolved in sufficient water to fill the vessel, is then added, and the mixed salts gradually stirred in. The whole is agitated for six hours. A dip sample is taken and tested with a standard $Na_2S_2O_3$ solution, using potassium iodide as an indicator. The standard solution is made so that 1 c.c. equals 0.02 BrCN, and for this about 93.6 grains of ordinary crystallized $Na_2S_2O_3 .5H_2O$ are dissolved in one litre of water.

A solution of copper sulphate is used for standardizing the $Na_2S_2O_3$ solution. The copper sulphate solution is made by dissolving one grain of pure copper foil in acid, converting to sulphate, and dissolving in 100 c.c. water. In testing Br CN solution, 5 c.c. are usually taken, Na_2CO_3 solution added till alkaline, and then acetic acid till acid. A few crystals of KI and some starch solution are then added, and the whole titrated with the standard $Na_2S_2O_3$ solution.

In other mines direct titration with $Na_2S_2O_2$ without first neutralizing the H_2SO_4 is in vogue. The results from this method have been proven to be usually low and irregular.

The vats should be kept under KCN treatment until the KCN residue is known. The alkalinity should then be corrected and the Br CN added.

Br CN does not act well in a too alkaline solution. The best action is obtained when the alkalinity is either about 0.01 per cent. or nearly neutral.

Mr. Nardin sums up the results of certain experiments thus:—

1. The daily ore sample should be taken in the morning and assayed as soon as possible, so as to know what was the value of the ore passing to the vats in the previous 24 hours.

2. The pulp should have a long KCN treatment.

3. A vat should be kept under KCN treatment until the value of the KCN residue is known.

The alkalinity of the vat should then be determined and corrected to 0.01 per cent. by H_2SO_4 before adding Br CN.

5. The quantity of Br CN added should then be determined from the value of the KCN residue, the tonnage of the vat, etc.

6. Lime added to the ore during crushing should be varied according to the alkalinity test after KCN treatment, so that the plant solution tests about 0.02 per cent.

7. Lime water should be made and added to the vats or to the solution from the presses, instead of adding lime to the vats.

8. All metallic iron should be removed in some way from the ore before treatment, as it is both a cyanicide and bromo-cyanicide.

HOSTOTIPAQUILLO AND THE LERMA RIVER.

Written for the Mining and Scientific Press

By Ezequiel Ordonez.

(Editor's Note:—Since a number of Toronto and Halifax men bought a group of mines in this district last winter (among these are the Mololoha and Albarradon, mentioned in this article), it is thought that the article will be of interest to some of our readers. Moreover, the article is a very clear, really vivid, description of a mountainous mining region, and is therefore of general interest. Mr. Ordonez is one of the best known geologists in Mexico, and was formerly Sub-Director of the Geological Survey.)

In view of the geological features and the great extent of the veins, Hostotipaquillo is one of the most important localities in the western Sierra Madre, Mexico. It lies within the District of Tequila of the State of Jalisco, in a mountainous region that is cut by the canyon of the river Santiago or Lerma, and is therefore in the region of high mesas, deeply carved by tremendous erosion. In no part of the country can one better appreciate the true physiographic character of the western Sierra Madre. The plateau has been the result of the piling of volcanic material upon an ancient land surface. There is now a marked difference in the two sides along one portion of the canyon. The south side, of which belongs to the central plateau, is 3,400 feet above sea level, while the opposite side, which belongs to the Sierra Madre, presents elevations that almost reach 6,500 feet above the sea, but on the plateau, long sierras rising above the plains reach and even exceed that elevation. The Santiago River, from the northwest of Guadalajara to Hostotipaquillo, has excavated its own bed, almost at the southern foot of a group of mountain ranges running northwest and appearing to terminate in the central plateau. Only a few of these ranges seem to be continuous farther south, and therefore the Sierra Madre presents different widths to the north and south of that river in the District of Tequila. The width of the Sierra Madre is so far reduced to the south of the river that if it were not for the northwest prolongation of the Etzatlan ranges and the great barranca de Mochiltictic, the Sierra Madre would be interrupted near the parallel of 21 degrees 30 minutes north latitude, to reappear subsequently farther south and with greater vigor in the regions of Pigintos and Mascota. If that interruption had been established there would have been a convenient pass in Central Mexico to reach the Pacific Coast, by only crossing a series of high tablelands from Guadalajara to Tepic.

The Cananea, Rio Yaqua & Pacific Railway, which will shortly connect the Mexican Pacific Coast with the great central plateau, by way of Tepic and Guadalajara, has encountered great difficulties in running through the narrow pass in the Sierra Madre to the northeast of Et. zatlan. Although the final route through that region has not yet been decided, it is important to notice that the railroad will not pass far from the town of Hostotipaquillo. It is said by railroad men that a line to cross the ranges and the barranca will require many bridges and viaducts, which in the aggregate will amount to one and a half miles, as well as several tunnels aggregating about the same length. It is well known that the western support of the great central plateau of Mexico is essentially eruptive in character, and that the mineral resources of that region have been exposed by deep erosion, because the high western edge of the central plateau was first covered with rhyolites and dacites that formed high mesas overlying the veins. These veins, which run through the underlying andesites, diorites, and Tertiary granites, would never have been revealed if there had not been carried off toward the coast a formidable volume of the acidic younger material that composed the marginal mesas. At present these mesas in the Sierra Madre are broken in every direction by deep ravines in which numerous veins appear.

The Santiago River is one of the most important in Mexico, with a length of nearly 1,200 kilometres, having its rise in the eastern corner of the high valley of Toluca from several springs that together form the muddy lakes of Lerma and Almoloya. This river bears the name of Lerma to the point where it discharges into lake Chapala, at about the middle of its course. Chapala was, in former times, a wide valley drained by the river, but at the beginning of the Recent era, a barrier of basaltic lava converted the valley into a large basin. After that the basin was broken by erosion, restoring the river to the ancient channel on its way to the ocean. In cutting its way through the Sierra Madre, the Santiago River exposed a mineral territory not less than 30 miles long in the neighborhood of Hostotipaquillo, the outcrop of veins ribbing the mountains in their slope to the river bed. In all this large territory are distributed the groups of mines called La Cobriza, Cinco minas, Santo Domingo, San Pedro Analco, Mina Grande, Quebradilla, as well as those of El Favor, San Jose, San Francisco, Cabrera, La Castellana, Refugio, Jora Vieja, and others not situated on independent groups of veins. The mineral system is seen to extend without interruption where erosion has already washed away the overlying strata newer than the veins. In this same region, and at short distances apart, are other famous mining districts, such as La Yesca, Bolanos, which, like some of the former, belong to a different political division. The town of Hostotipaquillo, the chief seat of the municipality, is outside of the mining area, as it is situated on the edge of the central plateau where it descends into the canyon. The geological structure of the Sierra Madre and of the central plateau is clearly and simply exhibited in this region. It is seen that the central plateau owes its elevation, as is well known, to the successive heapings of volcanic rocks upon older eroded lands. In this connection, any one could view a beautiful landscape from any of the high peaks that lift their heads about the right border of the Santiago canyon north of Hostotipaquillo. A trip to this region for this sole purpose would be worth the trouble. From a great height, supported by uniform steep slopes the geologist contemplates, over the horizontal line of the plains that form the central plateau, the volcano of Tequila with a great lava mass crowning its summit. The immense cone of this high volcano appears to repose on a large platform of lava, which is bathed by the waters of the Magdalena Lake. The nature of the ground is as suggestive as the landscape; rhyolites and dacites are the constituents of the mesas, and on such material rests the entire volcano of Tequila. These rocks lie on the Miocene andesites. In these andesites are found the veins along the lower level near the river and in the high hills in the neighborhood. The mountains are also frequently

crowned by remnants of rhyolite mesas in the form of bluffs. In the steep walls of the canyon are found blocks of columnar basalt in the form of cliffs and cornices; these are the remains of a basaltic plain over which the present river flowed, 1,200 feet above its present bed, and for a distance of no less than 50 miles.

The Rio Grande de Santiago has three times re-excavated its own bed in its passage through the Sierra Madre. The river first started by flowing through a large valley bounded by mountains of eruptive rock, because it must be stated that the rhyolites that formed the mesas did not spread over prolonged andesitic sierras, but over independent *massifs* close to each other, each with its own history of volcanic evolution, although many of the *massifs* were synchronous. The Miocene Valley became continually deeper by erosion, and by displacements due to faults along the dikes so numerous in the mining district of Hostotipaquillo. In the Pliocene era, the great overflow of rhyolite constituting the mesas, filled the basin of the rivers and interrupted the course of the waters, which soon commenced to run again over the mesas, filled up the basin of the river and interrupted the course of the waters. These soon commenced to run again over the mesas as well as underground, following their old channel. Near the coast, the river precipitates itself in falls and rapids, which continually work backward, as has been done in the east by the falls of Juanacatlan on the same river near Guadalajara. This waterfall, called the Niagara of Mexico, exists where the great stream ceases to serve agricultural uses and is converted into a source of motive power. The backward erosion of the waters, assisted by movements in block, have ended by re-establishing the old river bed, for the second time, in the form of a gorge with cliffs, afterward becoming gentle slopes. Lastly, this old valley has become the scene of a new geologic change. The uniform slope of the bottom favored the flow of a stream of basaltic lava many miles long and 100 to 300 feet thick. The erosion cut through and brought down these basaltic masses, allowing the river to return to its old bed. This third period of erosion in the Pleistocene and Recent eras, appears to have been more intense and prolonged than the two earlier, seeing that after the waters reached their former bed, they have continued their work of excavation, so that it is now 1,000 feet lower.



The State of Jalisco, Mexico

In this brief history of the Rio Grande de Santiago no mention has been made of the period in which the veins were formed; this probably was immediately before the appearance of the rhyolites forming the mesas. Nor has mention been made of the phenomena connected with the appearance of the dikes, some of which are older and some newer than the veins, nor of the fluctuations of surface-elevation on a large scale in the Sierra Madre.

The mining region of Hostotipaquillo has been worked ever since the commencement of the colonial period

in spite of the rough character of the ground, of the vicinity of warlike Indians in earlier days, and of the entire absence of roads. The last mentioned difficulty exists even at the present time. In the year 1804, Humboldt refers to the Hostotipaquillo mines as celebrated, and in the reporst presented by the Mining Deputatian of Hostotipaquillo to the Provincial Mining Board, in 1824, ample data with respect to the old mines denominated La Famosa, Deseada, El Refugio, Mololoha, El Tabor, La Espada, San Jose, Quebradilla, Mina Grande, and others were given. Some of these old mines are now undergoing development with large capital in the hands of companies, mostly American.

A complete list of all the companies now contributing



to the activity of the district cannot be given, but several are worthy of special mention. The Cinco Minas property, belonging to Martinez and Cardenas, has under development four or five mines. The property represents an approximate value of 500,000 piastres. Part of the ores from the Cinco Minas are treated in the Hacienda de Santo Tomas by the patio process. The El Favor Mining Co. operates an extensive property, of which the El Favor mine is the chief. Some of these mines show ore to the value of several million pesos. The Company is planning the erection of a large concentration and cyanide plant in which it will treat its abundant supply of low-grade ores. It will utilize a part of the water-power to be developed by the plant of the San Pedro Analco Co. The Cabrera group of mines belonging to the Virginia Mining & Milling Co., has been producing from the Cabrera mine for many years. The Company is now erecting a concentration and cyanide plant to have a daily capacity of 200 tons, and will obtain power from Santiago river. The mill will be erected close to the river bank, and the ores will be brought down from the mines by a cable tramway. The San Antonio Mining Co. is operating the San Jose, Las Palomas, San Antonia, and other mines. It is also operating the small Socorro mill, which is one of the oldest in the district. The San Antonio mill has 10 stamps, partly driven by electricity. The process employed is the patio, and the tailing is concentrated in the old Mexican way. The Jalisco Mining Co. has the Mercedes, Dona Ema, and other mines close to the old Mololoha and Hundido mines. Work is being pushed by an American company in the famous Casados mine. The exploratory work recently started has led to the discovery of a large quantity of ore. The Company is erecting a concentration and cyanide mill, besides exporting high grade ore. The San Felipe Mining Co. operates a mine near the village of Jocotlan. It also possesses a small concentration and cyanide plant, which is equipped with stamps, Bryan mills, and other modern machinery. The Santo Domingo Mining Co. has operated an extensive group of

mines, and completed considerable development work with the help of machinery. The principal mines operated by this Company are the Santo Domingo, Esperanza, Nombre de Dios, and El Favor. It is said that the Company has temporarily suspended work. The Castellana mines have for some years past been worked successfully with English capital. They now have a mill, driven by electric power, with a capacity of 40 tons per day. This Company utilizes a small part of the waters of the Santiago river for motive power. The Cia. Minera de San Pedro Analco operates an important group of mines on the right bank of the Santiago with satisfactory results. Some of the mines in this group are considerably developed. The San Pedro mill has six-stamp-batteries which crush 60 tons per day. The ores are treated by the patio process, although wtth rather high losses of silver.

As a general thing all the mills in the Hostotipaquillo district which treat the ores by the patio process give poor returns, as these ores are not adapted to that treatment. The cyanide process will give better results supplemented by concentration. The San Pedro Analco Co. has undertaken an important work in the construction of a dam 300 ft. long across the bed of the Santiago river, creating a fall of about 25 ft. Three turbines will be set up to handle a large volume of water, and develop 1500 hp. in an electric plant. The construction of this dam across the river reflects great credit on the builders and on the company. They have had to overcome enormous difficulties and incur heavy expenses. When the power plant has been installed, the San Pedro Analco Co. will re-construct its mill in accordance with modern principles.

Carlos Romero, of Eztatlan, Jalisco, is the owner of an important group of historic mines, such as Albarradon, La Famosa, Deseada, La Espada, La Quebradilla, La Descubridora, and others. He was formerly the owner of the Mololoha mine, which is famous in local history. The mining region of Hostotipaquillo already involves a valuation of nearly 35,000,000 piastras.

The veins in this region traverse andesite, dacite, and seldom diorite, and it is not a rare thing to find the veins also in breccia and in andesitic tuff. As a general rule, the veins are wide and continuous, especially in the eastern parts of the district, where veins are found with a width of 34 ft. The matrix is quartz and calcite. Large bonanzas were found in the old mines, but the dissemination of the ore throughout the veins gives this district special importance. Its future depends on the utilization of concentration, and cyanidation. As a general rule, the ores carry little gold, the most valuable mineral being silver sulphide, sometimes accompanied by galena, pyrite, and blende. There are also small quantities of copper ore, carbonate near the surface, and chalcopyrite below. In the oxidized zone, where secondary modications have taken place, the veins contain manganese, oxides, ferruginous clays, native silver, and in some cases, chlorides and bromides of silver. Practically the deposits form a series of linked veins running northwest, following the general orogenic axis of the region. The veins are frequently intersected by faults, but displacements are not great; they are also cut by dikes. The veins sometimes follow the direction of the older dikes for a long distance.

The enormous extent of the Hostotipaquillo mining region, the number and width of its veins, the abundance of its low-grade ores, the facilities afforded by the topography, the abundant natural resources, the completion of the railroad, will make Hostotipaquillo one of the most important mining districts of Mexico. For motive power, the Santiago river offers immense possibilities. It is reported that the Federal Government has given concessions for about 200,000 hp. to be developed along this stream.

EXCHANGES.

The South African Mining Journal, October 31, 1908.—In this number of our contemporary we find instructive records of mining and milling costs. One example is worth quoting. Knights Deep mine during the year ending July 31st, 1908, had an ore output of 504,890 tons; 200 stamps were kept in commission. The total yield of gold was £680,561, or an average of 26s. 11d. per ton. This average yield was lower by 2s. 1d. than during the previous year. But increased capacity and a large reduction in working costs brought the profits per ton up from 8s. 2d. to 10s. 1d. Instead of a 10 per cent. dividend a 25 per cent. payment was made. A payable ore reserve of 1,438,000 tons has been developed.

The Mining World, November 28, 1908.—"Methods Used in Sealing Off Underground Water," is the title of a paper by Edmund B. Kirby.

Known methods of sealing off or reducing incoming flows of water have not found any wide application in mining. They are generally excessive in cost and uncertain in result. Mr. Kirby's patent consists primararily in introducing into subterranean flows of water entering a mine, any kind of subdivided matter capable of being carried by those flows towards their exits and of being deposited in and choking up the passages leading to these exits. Finely subdivided clay, held in suspension by the water, is mostly preferred. Other materials, such as sand, wilth tailings or slimes, cement, saw-dust, horse-manure, chopped hay, etc., may be used.

This method has been employed to seal water flows for a distance of 240 feet,

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The Mining Journal (London), November 21, 1908.—A most interesting leading article is our contemporary outlines, "The Future of New Zealand Alluvial Gold-fields." It is stated that "it is only by such painful experience of diminishing profits as the fields have been and are still undergoing that they can attain to a healthy condition, and that investors can see for themselves that they are not throwing money into a hole and losing it."

Apparently both dredging and sluicing operations are not advancing; but local interests and the geological survey have been and are most active in exploiting new ground and in investigating systematically the whole field. Confidence is felt that dredging and sluic-

ing will be carried on in the future with much better prospects of success.

Electrochemical and Metallurgical Industry, November, 1908.—In the course of a paper on "Electrolytic Gold Refining," in this number of our contemporary, Dr. Emil Wohlwill takes exception to certain deductions of Dr. J. W. Richards. Dr. Wohlwill also reaches the following conclusions concerning electrolytic gold refining:—

1st. Before employing the process and before calculating its requirements and results, it is necessary to make a preliminary investigation as to whether the available raw gold alloy is suitable for electrolytic treatment.

2nd. If the raw gold alloy is found to be suitable, experience must decide on the current density to be used, according to the composition of the anode material.

3rd. If interest is to be charged for the gold, it is necessary and easy to modify the conditions of operation in such a way that the interest charge becomes a minimum.

The Engineering and Mining Journal, November 28, 1908.—Walter Renton Ingalls discusses most illuminatingly the question, "Has the value of gold depreciated?" Mr. Ingalls opposes the theory that the rise in commodity prices is due to the increased production of gold. He contends that (1) a great increase in gold production may occur without increasing wages and without attracting any large number of men away from previous occupation; (2) the profit derived from the production of gold is rarely expended at the place of production, but is distributed among many investors in the commercial countries of the world; and (3) much of what is considered to be profit is really not so.

Mr. Ingalls points out that labor unionism and the increasing inefficiency of labor have contributed to enhancing the prices of commodities. "It is scarcely to be doubted that the prices of commodities will continue to fluctuate in the future as they have in the past, independently of the world's production of gold, the effect of which upon prices at any time in the world's history has been but ephemeral and has been due to conditions that long since ceased to exist."

INDUSTRIAL SECTION.

Mine and Quarry, October, 1908.—The Sullivan Machinery Company issues this bright monthly. It contains several specially written and particularly practical articles. One of these, entitled, "A New Departure in Mine Power Plants," by George M. Crawford, describes the installation of the Cowanshannock Coal and Coke Company, at Yatesboro, Pa. Here is a central electric generating plant from which current in wired to substations, where the air compressors and motors that drive the machinery in each part of the field are located. All the air-compression and coal-cutting machinery was purchased from the Sullivan Machinery Company.

Canadian Westinghouse Co., Limited, Hamilton, Ont., Circular No. 1126.—Westinghouse Types C and CL transformers for pole mounting are illustrated in this circular. These distributing transformers operate in oil. Temperature rise is thoroughly guarded against, and complete insulation is thoroughly provided for.

Catalogue No. 11, Pennsylvania Crusher Co., Philadelphia, U.S.A.—The Pennsylvania Hammer Crusher for crushing coal is susceptible of quick adjustment. No shut down is necessary. By a turn of a hand wheel the cage is raised closer to the hammers. This is only a matter of seconds. In case of choking, or when inspection is necessary, the cage may be instantly dropped.

Crushing is becoming more and more essential as a preparatory step to coking, whether the coal is to be washed or not.

The Pennsylvania Crusher Co. also manufacturers the Pennsylvania Bradford Coal Cleaner, Coal Cleaner and Hammer Pulverizer (combined), Magnetic Separator, Rotary Crushers, Single Roll Crushers, Rock Crushers, Portable Rock Crushers, etc., etc.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.—The Dominion Coal Co.'s output for November was only 244,000 tons, which is 90,000 tons less than the previous November. The output for the year to date is 3,347,000 tons compared with 3,317,000 tons at the end of November, 1907. From present indications the tonnage for the year will be practically the same as that of last year, or slightly over 3½ million tons. It was anticipated at the beginning of the year that the output would reach 3¾ million tons, but in the face of the depression that has been general over the Dominion it is really a matter for congratulation that the Company have found it impossible to maintain the same output as in the previous twelve months, and to stave off the inevitable period of short work for so long. The break comes after a long and uninterrupted spell of prosperity, and it is confidently hoped that it is but temporary. Indications are not wanting of a return of confidence in the United States, and the mines there are beginning to feel the benefit of the increased demand for their product. This will relieve to some extent the persistent American competition which has been felt all Summer in the Montreal and Toronto districts, and which has had a grave bearing on the trade conditions in Cape Breton. It is perhaps not fully realized how very strenuous this American competition is becoming. In slack times when small profits or sufficient return to cover expenses are gladly accepted in order to keep the mines in operation and retain the workmen, it can be easily seen how convenient a dumping ground the Upper Canadian provinces and the large centres of population at the head of the Great Lakes may become for American operators. No one who has given thought to this matter but must confess that Canadians have all to gain and nothing to lose by weakening their tariff barriers. They are already but too weak to withstand the pressure of the enormous coal resources of the United States until such

time as our own coalfields shall have been fully discovered and developed. Nova Scotian coal owners at elast cannot afford to coquett with their friends in the States, nor can their workmen. The trade that is providing work for the members of the U.M.W.A. is the very same trade that is causing slack time in Cape Breton. There can be no friendship or reciprocity between American and Canadian coal interests, without serious detriment to the latter. The interests of master and man are the same in the matter. Those members of Canadian labour organizations or of trade leagues who favor amalgamation with the United States might profitably read the fable of the lion and the mouse that they may remember in the old "Fourth Reader." It is an illuminating lesson to take a good atlas and compare the cities, towns, and villages south of the frontier of Canada with the sparse lettering above that line, and then to study the mineral maps of the U. S. Geological Survey: Virginia, Pennsylvania, Alabama, Tennessee, etc., etc., side by side with the publications of our own Geological Survey. True it is that our Canadian mineral resources are yet unknown and may be only dimly guessed at, but it is also true that the stronger our tariff walls, the more quickly will they be discovered and opened up. Charity begins at home, and when one is dealing with a nation that has defied individualism and monetary success, we cannot afford sentiment. In Nova Scotia at any rate our ways lie separate.

U. M. W. A. vs. P. W. A

4th December, 1908.

The event of the week in the mining towns has been the ignominious failure of the perjury charge preferred by the representatives of the U. M. W. A. against the Grand Secretary of the P. W. A. It would tax the impatience of any reader to explain on how flimsy and intangible pretexts the charge of perjury was based. It is a fortunate thing for the purses of the ratepayers that such tiresome and perfectly useless cases are not often tried. The amount of legal hair splitting and learned argument that can be gathered around a point which the ordinary person would settle in five minutes puzzles a good many people. It will puzzle still others when the bills have to be paid.

The remarks of Judge MacGillivray on the situation are worthy of quotation. He referred to the good record of the P. W. A. and expressed his surprise at the unity and continuity exhibited by the history of this organization since its formation 26 years ago. It must have had good leaders and good managers to have accomplished all it had done. It was a great pity that any leader of the Association should be brought before the Court on a criminal charge as the result of a difference among the members, and that the funds of the membership were being frittered away in litigation. In finishing his judgment his Honour said: "The prisoner has been put in a position in which he should not have been placed, and in which he would not have been put except for the action pending against the Grand Council—were it not that there was too much anxiety by Counsel to get information for use in the Civil Court. I have already, in other cases, had occasion to condemn this practice. Spite and revenge are not the law of the land, and should not be the foundation for putting into effect the processes of the law, especially when the Crown must pay all the expenses of the trial except the costs of the prisoner's Counsel. In my opinion if this prosecution had been founded on the allegation of the prisoner having committed the offence and had not been ancillary to another action it would never have been brought".

An interesting sequel to the trial is an open letter from the Grand Secretary, in which he charges the local organizer of the U. M. W. A., one of the leading spirits of the prosecution, with misappropriation of the funds of Pretoria Lodge, and states that he himself had protected this man from arrest and criminal prosecution.

What will most of all appeal, we think, to the Nova Scotian members of the P. W. A. in the learned Judge's remarks is his advice to steer clear of international union. We have on several occasions expressed the same view in stronger terms, and it is gratifying to find this opinion is also held by a gentleman so competent to give one. Canadian labour unions cannot afford union with those of the United States, particularly when engaged in trades that enter into commercial competition. If the iron vessel and the earthenware pitcher go to the well together some day something will be broken. Professor Shortt, whom no one can justly accuse of partiality, has recently expressed himself as opposed to international union in this matter and as favoring the fostering of a national spirit in trades unionism as well as in other matters pertaining to the welfare of the people.

No empire in the world's history was ever founded on a truer democracy than that of our own, and nowhere in all its vast realms has it produced a fairer flower than in Canada. We do not want the peculiar methods favoured by American unions to destroy the innate love of law and order which characterizes our people. We can dispense with that feature of industrial warfare which ranges on one side the deputy sheriff with his loaded Winchester, and on the other murder, bomb-throwing and the red rage of unbridled anarchy. They are foreign to our country and our empire, and we think our miners will be wise if they do not join hands with organizations that use such methods.

BRITISH COLUMBIA.

Rossland.—The situation at the Le Roi No. 2, Ltd., is improving. The official confirmation is now at hand regarding the strike on the 500-foot level of the rich big ore body that was pierced by diamond drill. Several wide veins were cut, and assays from the core gave returns of as high as $73 per ton. The diamond drill hole was put down in the direction of the top of stope No. 3 on the 700-foot level.

During the month of October the Le Roi mine here made a better showing than it has for many months. It is estimated that the profits on the company's operation were in the neighborhood of $50,000. During that month 6,861 tons of ore were shipped to the Northport smelter, that returned an average value of $18 per ton. During the year last reported on by the company's directors the average value of ore shipped was $10.02, but a much larger tonnage was shipped than during the year 1906, when the average value per ton was $10.50. However, it is pleasing to see that the Le Roi can, with a little effort, get in and make a good showing once in a while. The amount expended for development during October was lower than it has been running, $1,500. It is important to note in connection with this month's work that most of the ore was mined in the 1,650-foot level of the Le Roi, where the gold values predominate, the copper falling away to some extent.

Ore shipments from Rossland district has been rather heavy during the last few months, and it now looks as though the Centre Star group would exceed their total tonnage for last year, by the 31st of December next, to the extent of over 50,000 tons. The Le Roi No. 2, Ltd., shipments will not differ much one way or the other, while the Le Roi record will fall about 35,000 tons under the shipments for 1907. But this may not have an important bearing on the moneymaking features of the company's operation, as the ore that was shipped should prove to be of a higher grade than that sent to the smelter during 1907.

The first assessment levied by the White Bear Company under the new organization has been paid up. Another assessment should place the company in shape to go ahead with the

work that was planned prior to the last closing down. The shaft will be deepened, with the prospect of getting into rich ore regions that are thought to lie at depth on this property. If the White Bear ever did stand a chance to make a paying mine, it is with conditions as they now are at the mine. Some good ore has been opened up, but not in what is known as large quantities in this camp of large lodes. As the ore has improved with depth, it looks as though the hopes of the mine lay still deeper in the ground.

Mr. W. D. Matthews, of Toronto, president of the Consolidated Mining and Smelting Co. of Canada, visited the Centre Star group and the company's smelter at Trail during the past week. Mr. Matthews was well satisfied with the way affairs were moving with the company's property in this section. There is little doubt but that the report of the Consolidated for the last year will prove favorable, as things have gone well with the mines and smelter of this organization during the past twelve months.

Boundary.—The declaration of a 2 per cent. dividend by the directors of the Granby Company was received with satisfaction throughout this district. This is the second dividend the Granby Company have paid out of their earnings this year, which goes to prove that the expense of mining and smelting has been reduced by the management to a minimum figure, this being absolutely necessary for the realization of profit when selling copper on a low-priced market. The Granby Company have paid ten dividends since December, 1903, amounting in all to $3,508.630.

The entire battery of eight furnaces has been in operation at the Granby smelter during the past week, including the remodeled furnace, which is giving good results.

Ore shipments from the Granby mines alone should pass the million ton mark before the end of the year. This year the Granby will exceed the shipments of 1907 by over 400,000 tons. As it is officially stated that there is a greater reserve of ore, developed by diamond drill and other development work, in the Granby mines than they have shipped so far this year, there must be nearly a million tons of ore "in sight."

Shipments from the Mother Lode will exceed those for 1907 this year by approximately 100,000 tons, while the shipments from the Oro Denoro will exceed the output of the Emma for 1907 by 65,000 or 70,000 tons.

Mr. Frederick Keffer, consulting engineer for the British Columbia Copper Co., with a small staff of assistants, has made an examination of the more important of the mines of the Dominion Copper Co., including the Brooklyn, Mountain Rose and Sunset. While no information has been given out, it may be that one of the big consolidations would like to lease these mines, treating the ore in the larger and more up-to-date smelters than that of the Dominion Copper Co. at Boundary Falls. The proposition is feasible.

The output of the Snowshoe mine is now being divided between the company's smelter at Trail and the Greenwood smelter of the B. C. Copper Co. This is along the lines that the output of the mine was handled last year.

The National Trust Co., in the Supreme Court at Vancouver, has asked for judgment on the $800,000 mortgage they hold of the Dominion Copper Co. The application was opposed by counsel. Mr. P. F. Roosa, manager and provisional liquidator for the Dominion Copper Co., has gone to New York City in connection with reorganization matters.

With the ore sent from the Boundary during the last couple of weeks the Boundary ore shipments pass the 7,000,000 line. The Granby shipped over 65 per cent. of this heavy tonnage, the Mother Lode mine about 20 per cent., and the other smaller properties in proportion.

The Keremeos Copper Co., controlled by Spokane mining men, has been registered as an extra-provincial company. A contract has been let for a 1001foot tunnel. The company has three promising claims in the Similkameen.

Nelson.—The mining interests of the Slocan are looking forward with some interest to the decision of the Supreme Court of Canada in the case of Byron S. White Co. vs. the Star Milling and Mining Co., of Sandon. It is expected that this case will be disposed of by the court before the holidays, and as it will establish a precedent which will affect Slocan mining to quite an extent in the future, hence the interest. It seems the B. S. White Co. followed a lode, of which they claim to have the apex, which dipped into a claim owned by the Star Company. The apex may be traced through several claims of the White Company on the surface, and indications of ore are easily followed along the vein on the 300-foot level. There is a barren strip on the 600 level where the ledge has faluted and, as the writer understands the case, the point of contention is whether this barren strip extends to the surface and makes what legally may be termed another vein, or whether the ore body would be designated as one vein that had faulted and the apex rights having been established that the company having the apex may follow that vein into the vertical lines of the adjoining property.

This will be the first important decision that has been given by the Supreme Court in British Columbia mining law, and the outcome is being looked forward to.

Several Spokane mining men visited the reduction works of the Canada Zinc Co. during the past week, and they say that if the process proves a success for the treatment of zinc ores, it is very likely that a similar plant will be built at Coeur d'Alene, Idaho, to treat the lead-zinc ores of that district.

Mining men here have noted with interest the resolutions passed by the trustees of the Spokane Chamber of Commerce and Denver and Missouri interests protesting against the reduction of the tariff protection now on lead and zinc products, as the matter, to a small extent, affects the zinc-lead miners of the Slocan at the present time. The present duty is 1½c per lb. on lead ore and 2½c per lb. on lead bullion. Very little lead is shipped to the United States for consumption, but there is an occasional shipment to some point in the States for manufacture, and when the manufactured article is exported from the United States a rebate is granted, a small sum being withheld for charges.

The power lines are now into the Silver King mine, and the electrically operated pumps will soon have the mine unwatered. As soon as this is accomplished it is the intention to begin work on the lower levels of the property.

The zinc smelter of the Canadian Metal Co. at Frank is being dismantled, and will soon only be a matter of history. While the company received what appeared to be valuable concessions at Frank, they were too far from the source of the product they were to treat, and the freight rates had much to do with the failure of the enterprise.

Even New Denver is sharing in the prosperity that is noticeable in the Slocan. The Molly Hughes has been again opened up and a small crew put to work.

A two weeks' run of the four-stamp mill at the Nugget has resulted in a $5,000 gold brick, one-half of which it is estimated is clear profit.

About $250,000 of French capital has been placed into alterations and improvements about the Blue Bell in the last 18 months, and the property is now in good form for a heavy production. The stamp mill (110 tons), which is capable of treating a large tonnage, has been running more or less steadily

since July, and has treated 15,000 tons of Blue bell ore. The company has shipped over 2,000 tons of concentrates to Trail smelter.

The Iron Mask mine at Kamloops has been sold to West Duluth mining men, and a force of twenty men put to work. It is the intention to work about 100 men at this mine in the spring. Lack of smelter facilities has handicapped the Kamloops mines considerably in the past, and it is now thought that a small smelter will be erected near the Iron Mask. This would prove a great stimulus to the Kamloops copper properties.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney Mines.—Owing to scarcity of shipping the Nova Scotia Steel and Coal Company has closed all but its No. 3 Colliery.

Halifax.—It is expected that the new Technical College will be completed next July.

NEW BRUNSWICK.

St. John.—Chatham has been provisionally selected by the Canada Iron Corporation as a shipping port for their iron ore from the deposits near Bathurst. It is possible that a smelter will be erected there also.

ONTARIO.

Sault Ste. Marie ,Dec. 3.—The steel plant of the Lake Superior Corporation closed down this morning at 6 o'clock, according to the statement of General Manager Franz, from lack of orders. Rolling for the last order of the Transcontinental Railway was finished this morning.

The management announces that the plant will re-open on January 1. The blast furnaces will continue operating in full force.

Sudbury.—The Crystal stamp-mill, near Lake Wahnapitae, has been closed temporarily on account of shortage of fuel. During the recent forest fires the Company's entire stock of cordwood was burned.

Cobalt.—The Flynn property, near Cross Lake, has been purchased by a small syndicate of Toronto men, under the name of the Pontiac Mining Company. Very little silver has been discovered. One vein of calcite and smaltite has been worked to a small extent.

The concrete foundations of the O'Brien concentrating mill has been completed. The frame work is now under construction.

Development work on the properties of La Rose, Cons. Mines Co. during the month of October was as follows: La Rose mine, 493 feet and 764 cubic yards of sloping. Princess mine, 104 feet. University mine, 18 feet, some open cut work. Violet mine, 1,090 feet of trenching, besides a small amount of open cutting.

An average number of 242 men were employed on the company's properties during the month. A contract has been entered into with the American Smelting and Refining Co. for the treatment of La Rose low grade ores at Denver. This contract is more favorable than the schedule under which La Rose ores have been marketed in the past.

The Green-Meehan and Red Rock Cobalt concerns, which have been amalgamated, will be called the "Mount Royal" in future.

BRITISH COLUMBIA.

Frank.—The zinc smelter of the Canadian Metal Company is being dismantled.

Michel.—The pay roll of the Crow's Nest Coal Co. for Michel for October is $97,800.

Nelson.—Where a year ago only the Queen mine and a stamp mill were working on Sheep Creek, at present there are six others, the Kootenay Belle, Bonanza, Mother Lode, Golden Fern, and Nugget. The Queen has improved its water supply and has added 10 stamps to its mill. Two 20-stamp mills are projected, the first for Mother Lode and Kootenay Belle, together, and the second for the Nugget.

Sandon.—Up to November 28, the Reco mine has shipped 456 tons to the Trail smelter. At that date there was a pile of 5,000 sacks awaiting the first substantial fall of snow when rawhiding will be commenced. There is much ore, also, broken in the stopes, and the chutes are full. It is believed that the Reco can ship a carload a day during the winter. Since 1905, during which year the Reco paid $20,000 in dividends, the mine has not been worked with uniform success. But last spring it was leased to an Italian miner, who is doing exceedingly well.

Nelson.—The second Relief mine, opened first in 1896 by Finch and Cameron, is being worked successfully under lease by Messrs. Hudson and Bell. A 10-stamp mill is in operation. The vein worked ranges from three feet to 12 inches in width. Nearly all of the ore is reported as payable.

The Mother Lode mine in the Sheep Creek camp, is shipping good ore to the smelter.

Rossland.—Electric power is being installed at the Silver King and Victoria mines, near Nelson.

A 500-foot tunnel is to be driven into Wallace Mountain to cut the veins of the Bell Mining Company's properties.

Vancouver.—Near the old Cornell workings, on Texada Island, abounded twelve months ago by an English syndicate, after a uarter of a million dollars had been spent, it is reported that a large body of copper-gold ore has been encountered. Insufficient development has been done to make any final statements about the size and character of the vein. But it promises well.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The continued depression in the South Wales coal export trade is being severely felt, and large numbers of the coal miners are on the verge of starvation.

Wales is the only gold-producing area in the British Isles, and the output is not large. In 1907, 12,978 tons of gold ore, valued at £5,625, were produced, as against 17,384 tons, of the value of £5,343, for the previous year. It was practically all raised in Merionethshire, where it occurs in quartz veins traversing the Cambrian rocks.

The Durham Coal Trade Conciliation Board has reduced coal miners' wages 3¾ per cent.

FRANCE.

Important experiments as regards coal-dust explosions were recently made at the French Government's testing galleries at Lievin, which demonstrated that grisontine couche, employed for the last two years in the coal mines of Northern France, is a safety explosive, and that by placing in sections deposits of inert matter throughout the galleries danger in case of accidents was limited.

The French Government has proposed important amendments to the mining laws, which will open the way to the acquisition of mines by the state whenever such a step appears advisable.

The first steel ingot ever cast in Denmark was recently produced at the new works of Messrs. Burmeister & Wain, at Copenhagen.

RUSSIA.

Large quantities of Russian iron ore have lately been shipped to Silesia, but in view of the injurious effect of this trade on the Russian iron industry, the Government has decided to enforce strictly the existing regulations prohibiting it.

The Societe des Usines Metallurgiques de Moscow has erected tin-plate plant and imported 27 workmen from South Wales.

AUSTRO-HUNGARY.

The Austrian mining authorities have issued new regulations for the prevention of fire in the oil districts, compelling every oil well owner to provide adequate storage facilities for his output.

UNITED STATES.

Two new coal fields have been discovered in Indiana. Northwest of Bloomfield, Green County, workmen drilling for water struck a vein of workable thickness at a depth of 130 feet, and in the course of drilling a well in Bartholomew County a farmer encountered a rich vein 25 feet thick about 100 feet down.

Cripple Creek, Colo., bids fair to reach the quarter-billion mark in production by the close of the year, the total output of the camp up to the end of October being $248,374,312. The present year's output so far has exceeded that of the entire years 1907, both in tonnage and value, the yield for the ten months ending with October being 632,426 tons, valued at $13,496,299. By the adoption of modern methods in the treatment of low-grade ores, thousands of tons are utilized that were formerly thrown out on the dump.

Two new quicksilver mines are being opened on the Pacific Coast. One is the Florence Mack, west of Coalinga, Fresno, County, Cal., and the other near Ione, Humboldt County, Nev., where a reduction plant is being installed.

On November 28th an explosion occurred in the mine of the Pittsburg-Buffalo Coal Co., at Marianna, Pa., which resulted in the death of 135 men. Immediately before the disaster a mine inspector had completed a two-days' inspection of the workings, which revealed no cause for apprehension. The force of the explosion was so great that woodwork about the mouth of the shaft was blown a distance of 2,000 feet. Most of the victims were suffocated by smoke, as the explosion put the ventilating fans out of order.

MEXICO.

A rich telluride gold deposit has been discovered in an almost inaccessible bluff in the Arteaga mining district in the western part of the State of Chihuahua.

JAPAN.

The metallic production of Japan for the six months ended June 30th was as follows: Gold, 35,905 oz.; silver, 1,706,443 oz.; copper, 24,348,834 lbs.; iron, 18,318 long tons. The exports of copper amounted to 2,458,253 lbs.

AUSTRALASIA.

The smelting companies of Wallaroo, Australia, have decided to use German coal in future on account of its relative cheapness as compared with the coal of New South Wales. The difference is due to the cheapness of labor in Germany.

The low price of silver has resulted in the discharge of a number of miners at the Colon Peaks, Yerranderie, N.S.W., as the cost of production leaves no margin of profit at present rates.

A rush to the Poseidon country, Victoria, has set in owing to some rich finds of gold near Tarnagulla.

COMPANY NOTES.

At the recent Dominion Copper Co. meeting there was represented approximately $500,000 of the $800,000 bonds. General Manager White, of the National Trust Co., presided, and stated that the property is likely to be sold.

No plan for reorganization was presented, but the following committee of bond-holders was appointed to examine the situation and report: Hon. W. W. Foster, John A. Sleicher, Warren Castle, Prof. Stebbins, H. H. Melville, and Messrs. Williamson and Shields.

The La Rose Consolidated Mines Co. announces that a contract has been entered into with the American Smelting and Refining Co., for the treatment of the low grade of the former, at Denver. This contract is more favorable than the old contract.

The Kerr Lake Mining Company has declared the regular quarterly dividend of 3 per cent. payable December 15. Books close December 6, and re-open December 17.

The Cobalt Central has announced officially that a dividend of 2 per cent. will bedeclared in December.

The directors of the Buffalo mines met yesterday and declared a dividend of 5 per cent. and a bonus of 1 per cent. per month for the current quarter, this being at the rate of 32 per cent. for the year.

The Cobalt Silver Queen Co. has decided a quarterly dividend of 2 per cent. Heretofore the company has also declared an additional 2 per cent. bonus at the quarterly period, but owing to the fire on July 12 last this extra disbursement has been suspended for the present.

The shareholders of the City of Cobalt Mining Company at a meeting on November 30 authorized the directors to increase the capital from $500,000 to $1,500,000, each shareholder to receive three shares for every one now held. They also decided to issue the stock now in the treasury to the shareholders pro rata, being 10 3-4 shares for every hundred shares.

The directors decided after the meeting to pay a 10 per cent. dividend on the 15th of January on old capital; $500,000, and to add a large quantity of machinery to the plant. The

last dividend was five per cent., or twenty per cent. per annum. The new rate represents forty per cent. per annum.

After a lengthy session on Nov. 30th, the directors of the Crown Reserve Mining Company the directors decided to pay a dividend on the capital stock, of 12 per cent., and a bonus of 4 per cent., making a total disbursement of 16 per cent. to stockholders.

The twelve per cent. dividend is for the half-yearly period, ending December 31, 1908. In future the dividends will be on a six per cent. quarterly basis, which is at the rate of twenty-four per cent. per annum.

Bonus payments will be made quarterly and will be in accordance with the surplus earnings of the company. In this respect it is interesting to note that, after allowing for the current disbursement, the company will have by the end of this year in cash on hand and owing by the smelters in excess of $250,000, while there will be at least $100,000 of ore in the ore house. The surplus would be sufficient to pay another twelve per cent. bonus on the company's stock.

The company has paid for plant and equipment houses and miscellaneous expenditure out of earnings, and have been working on proper mining methods for less than eight months of the year.

The books close December 15 to January 15, both days inclusive, and the dividend will be paid January 15. The annual meeting will be held January 13.

THE CONIAGAS MINES, LIMITED—DIRECTORS' REPORT.

To the shareholders of The Coniagas Mines, Limited:

Gentlemen:—

During the past year your Mine has been operated without interruption with a force of about 125 men.

The Concentrating Mill has been extended and twenty stamps have been installed, with an economical gas engine to run the mill, and increased concentrating machinery. Ten more stamps will be installed immediately, and the capacity of the mill (and therefore of the mine) will be incerased to about 90 tons per day, as against about 45 tons during the past year.

Additional camp accommodation for the men has been provided, and many dwellings have been erected and rented to the married employees as shown on plan accompanying this report.

A new shaft has been sunk near the mill to the 150 feet level and all ore is hoisted in this shaft and dumped direct into the mill.

The ore in the lower level is found to carry equal values to that found in the upper level, and the accompanying plan shows that a large amount of ore has been developed on that level without any dead work whatever, veins having been found running in directions suitable for the proper development of the mine. (The accompanying plan of the mine shows the conditions up to Sept. 30th only, in order to get printing done in time for the Annual Meeting.)

The Keewatin formation has been encountered in the westerly part of your mine in both levels, cutting out the veins, and proves to be dipping very uniformly to the east and south, indicating that probably a very productive portion of your property has not yet been reached. The underground workings and surface explorations may now be considered to cover an area of about 12 acres of a total of 40.

Your Directors desire to express their appreciation of the efficiency of the entire staff during the past year, and of the spirit of harmony and enthusiastic co-operation shown in all departments.

The following table shows the work done to date, and the work done during the past year ending October 31st, 1908.

Cross cutting	641 feet.	545 feet.	96 feet.
	Total to Oct. 31, '08.	To Oct. 31, '07.	Done During past year.
Shaft sinking	422 feet.	150 feet.	272 feet.
Drifting..	3756 feet.	1660 feet.	272 feet.
Winzes	94 feet.	00 feet.	94 feet.

Estimate of total rock excavated to Oct. 31st, 1908:

Cross cutting	2,280 tons	(barren ground)	2,280 tons
Drifting	12,980 "		
Stoping	13,680 "		
Open cutting	4,680 "		
Shaft sinking	1,400 "	" "	250 "
Winzes	320 "		
	35,340 "		2,530 "



VIEW OF THE CONIAGES MINE, COBALT, ONT.

Of the above total		35,340 "
Barren rock	2,530 tons	
Mill rock in surface dumps	14,796 "	
Mill rock in stopes	3,950 "	
	21,276 "	21,276 "
Estimate of rock that has been milled		14,064 "

of which there is stocked 4,000 tons of jig tailings with a silver content of about 13 ounces per ton to be recrushed.

From the above amounts the rich ore was hand picked from about 33,000 tons, and 14,064 tons have been concentrated, yielding 297 tons of concentrates.

The total silver produced by this property during the past year is 1,444,229 ounces, making a total to date of 3,444,000 ounces, and a careful estimate of the ore in sight as actually developed by the under-ground workings amounts to thirteen million ounces.

The average price obtained for silver for the past year was 52.3c. per ounce, as against an average price for the previous year of 67.05c. an average difference of 14¾c. per ounce.

Your Company owns the issued capital stock of The Coniagas Reduction Company, Limited, with the exception of six shares, issued to directors to qualify.

The works at Thorold are now handling the product of your mine and are running commercially as regards the production of refined silver and refined white arsenic, and we expect to place refined cobalt oxide and nickel oxide on the market very shortly, thus refining and marketing all the valuable constituents of your Ores by a process which is confidently expected to yield a substantial profit.

The Coniagas Reduction Company, Limited. Dominion Government Charter. Capitalization, $250,000.00; par value of shares, $100.00. Directors: R. W. Leonard, President, St. Catharines, Ont.; Alex. Longwell, Vice-President, Toronto; Milton L. Hersey, Montreal, Que.; W. M. Boulbee, Toronto, Ont.; Welland D. Woodruff, St. Catharines; R. L. Peek, Thorold, Ont.

All of which is respectfully submitted. R. W. Leonard, President and General Manager.

THE CONIAGAS MINES, LIMITED.

After careful examination of the books and vouchers of The Coniagas Mines, Limited, for the 12 months ending Oct. 31st, 1908, I beg to report that I find the books systematically kept, from which the following abstracts are correct. R. Fowlie. Auditor; St. Catharines, Ont., Nov. 17th, 1908.

Financial Statement for the Year Ending Oct. 31, 1908.

Assets.

Mines and Minerals	$3,985,700.00
Office equipment	200.00
Machinery and plant	68,237.95
Camps and buildings	82,153.56
Camp equipment	2,502.51
Camp supplies inventory	1,580.52
Coniagas Reduction Co. stock	100,000.00
Accounts Receivable	262.58
Cash on hand and in Bank	173,742.31
Ore in transit	173,993.91
	$4,544,373.34

Liabilities.

Capital stock	$40,000,000.00
Unclaimed wages	45.31
Dividend payable	120,000.00
Accounts payable	107,847.73
Surplus	326,480.30
	$4,554,373.34

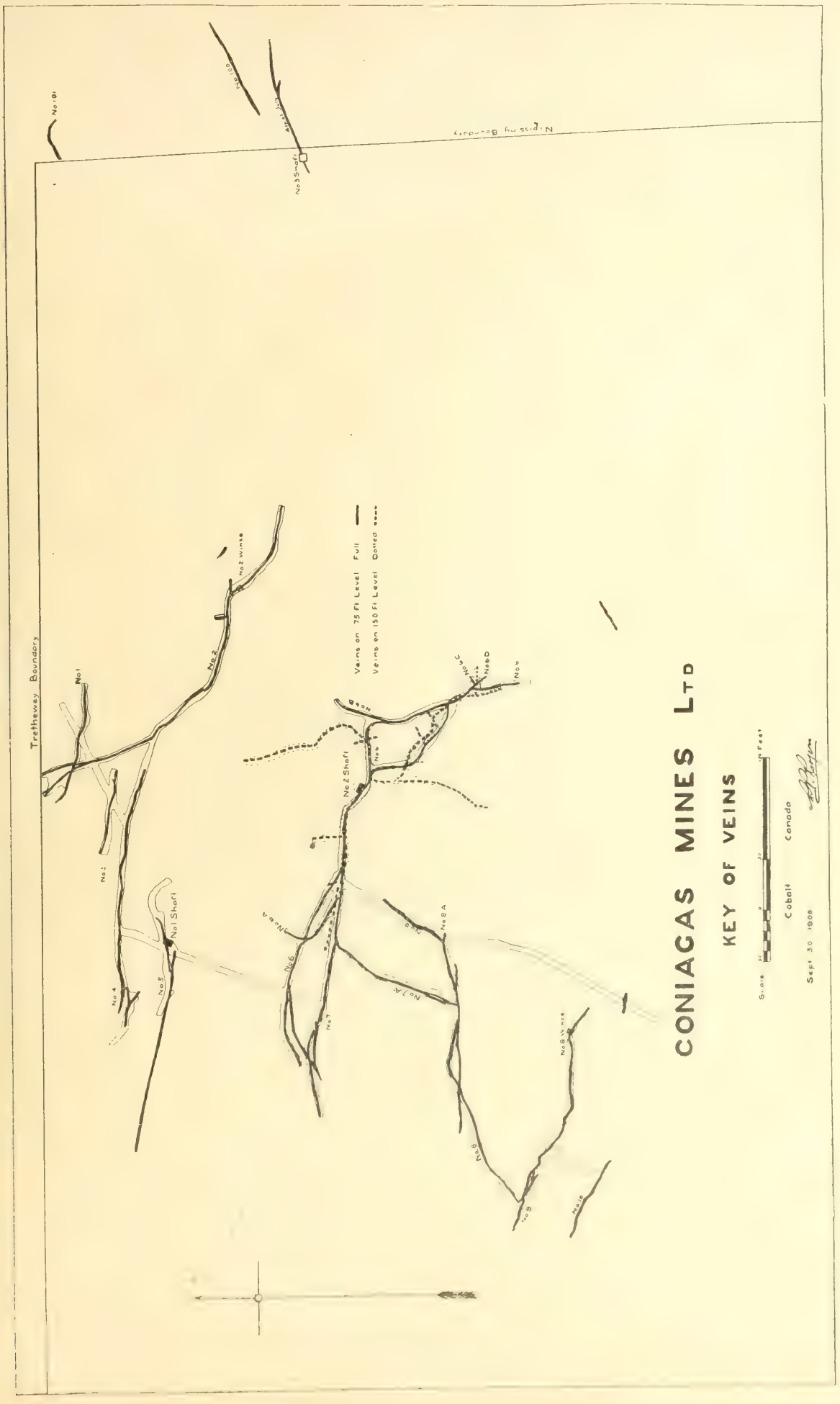
Examined and found correct, R. Fowlie, Auditor; J. J. Mackan, Secretary; St. Catharines, Ont., Nov. 17th, 1908.

Working Account.

To Administration and Supervision	$22,360.91
" camp expense	13,090.28
" Lands and Roads	9,962.33
" Mining	[illegible]
" Fuel, oil and waste	26,314.65
" Milling and sorting	30,196.38
" Sale of ore	11,372.36
" Legal expenses	[illegible]
" General expenses	[illegible]
" Transportation and travelling	[illegible]
" Taxes and Royalty	[illegible]
" Balance to loss and gain	[illegible]
	$7[illegible]



THE THOROLD SMELTER OF THE CONIAGES REDUCTION COMPANY


CONIAGAS MINES LTD
KEY OF VEINS
Veins on 75 Ft Level Full
Veins on 150 Ft Level Dotted
Trethewey Boundary
No.1
No.2
No.2 Shaft
No.3 Shaft
No.4
No.5
No.6
No.7
No.8
No.8A
No.9
No.10
No.11
Cobalt Canada
Sept 30 1908

By Ore revenue	709,414.61
" Camp revenue	15,391.59
" Interest and Discount	1,514.36
" Rent	874.66
	$727,194.66

Loss and Gain.

To Dividend paid Jan. 1st, 1908	$80,000.00
" " " Mar. 1st, 1908	80,000.00
" " " May 1st, 1908	80,000.00
" " " July 1st, 1908	80,000.00
" " payable Nov. 1st, 1908	120,000.00
" Balance, (surplus to date	326,480.30
	$766,480.30
By balance, (gain) from Oct. 31st, 1907	$264,762.22
" Mine Profit for year ending Oct. 31st, 1908, as shown in working account	501,718.08
	$766,480.30

Examined and found correct, R. Fowlie, Auditor; J. J. Mackan, Secretary; St. Catharines, Ont., Nov. 17th, 1908.

The annual meeting of the Nova Scotia Silver Cobalt Mining Company, Limited, held at the office of the company, 171 St. James Street, Montreal, was attended by a large number of shareholders.

The financial statement of the company was exceedingly pratifying, in view of the fact that this property is now being developed with due regard to the future shipments of ore.

The consulting engineer of the company, Mr. Benjamin B. Lawrence, explained at some length to the meeting that to make regular shipments of ore it is necessary to get the mine fitted up for the economical handling of the large body of ore known to exist on this property.

The profit for the year on the shipments of ore amounted to	$104.117 04
This does not include a large quantity of screenings ready for shipment, which will be sold this winter, netting the company at least	150.000 00
The second-class ore is also estimated to net the company within the next six months at least	100,000 00
This would make a total of	$354.117 04
For ore extracted during the year at a cost to the company of	103.198 00
Leaving a surplus on ore account of	$250.919 04

The ore body exposed in the mine from the report of our consulting engineer varies from 4 to 8 feet wide, and has been tapped on the lowest level, namely, 165 feet from the surface, where some very rich silver veins hav also been found.

The directors have every reason to believe that dividends on this property will be paid some time next year.

The machinery, buildings, and equipment are considered the best in the camp. The shareholders ought to be congratulated on the future prospects of this property.

The company decided to accept an offer of 65 cents a share for the balance of the treasury stock.

The following directors were re-elected: D. M. Steindler, president; Mortimer B. Davis, Vice President; Jacob A. Jacobs, Secretary-Treasurer; A. M. Bilsky, Managing Director; A. M. Reaper, Director.

STATISTICS AND RETURNS.

The official bulletin of the Antwerp bureau of commerce, which undertakes annually the task of compiling the coal output statistics of the entire world, has just announced the following figures for the year 1906, the last for which definite results have been obtainable. The world's total coal out-put for 1906 amounts to 893,249,557 tons, as against 844,194,217 tons in 1905. Ten years ago, in 1896, the grand total was 546,742,207 tons, in 1886 it was 303,207,780 tons, in 1870 it was 203,321,112 tons, and in 1850 only 89,881,357 tons—a striking record of the progress of the world's industries. The first place as a coal-producing country is held by the United States of America, whose record for 1906 was 375,397,000 tons, more than 42 per cent. of the total. This place it has held since 1899. The second place upon the list is held by Breat Britain, with a record of 251,050,000 tons, over 28 per cent. of the total. Germany comes next, with 136,480,000 tons, about 15 per cent of the tota,l and France makes a very bad fourth, with 34,313,000 tons. A very interesting development is shown by Japan and Canada. Japan appears to have increased her production from 1,243,000 tons in 1905, to 12,500,000 tons in 1906, while the Canadian production in 1906 amounted to 9,916,000 tons, or five times as much as it was twenty years ago.

DOMINION COAL SHIPMENTS.

The Dominion Coal Co.'s output for November was 244,304 tons; shipments, 233,558 tons.

Shipments from the collieries of the Cumberland Railway and Coal Company, for the month of November, were 26,709 tons.

BOUNDARY SHIPMENTS.

Granby	23,272	[illegible]
Mother Lode	9,847	[illegible]
Snowshoe	2,279	28,831
Oro Denoro	590	54,746
Sally	20	128
Other mines	.....	22,511
Total	35,928	1,309,941

ROSSLAND SHIPMENTS.

Centre Star	4,762	[illegible]
Le Roi	2,[illegible]3	71,994
Le Roi No. 2	574	26,738
Le Roi No. 2, milled	260	9,970
I. X. L.	3	6
Other mines	.....	1,282
Total	7,902	269,398

NOVA SCOTIA STEEL OUTPUT.

Nova Scotia Steel's outputs for November were: Coal, 54,400 tons; pig iron, 4,580 tons; steel, 3,600 tons.

The output of the Crow's Nest Coal Company collieries for the week ending December 4 was 18,457 tons a day average of 3,076 tons. Week ending December 6, 1907, 23,212 tons, a daily average of 3,869 tons.

The output of the Crow's Nest Coal Company collieries for the week ending November 27 was 17,728 tons; daily average, 2,956 tons; week ending November 29, 1907, 21,800 tons; a daily average of 3,637 tons; week ending November 30, 1906, 13,736 tons, a daily average of 2,289 tons.

Shipments of ore from the Cobalt camp last week slightly exceeded the previous week, when they amounted to 635 tons. Last week they amounted to 700 tons.

The total shipments for the week were 1,401,960 lbs., or 700 tons, and the total for the year so far is 42,816,550 lbs., or 21,481 tons. Details follow:—

Mine.	Nov. 28. Week ending	Jan. 1. Since
Buffalo	.....	1,016,950
Coniagas	64,000	2,261,288
Cobalt Lake	.....	404,623
Crown Reserve	60,000	890,688
Cobalt Central	.....	527,935
Chambers-Ferland	.....	442,890
City of Cobalt	.....	1,368,000
Drummond	.....	1,291,520
Foster	.....	437,300
Kerr Lake	.....	1,152,794
King Edward	.....	127,240
La Rose	217,910	8,360,370
McKinley-Darragh	240,000	3,271,470
Nipissing	248,130	3,784,160
Nova Scotia	.....	487,675
Little Nipissing	.....	40,110
Nancy Helen	.....	408,977
Peterson Lake	.....	41,237
O'Brien	191,920	6,420,857
Right of Way	.....	1,300,770
Provincial	.....	143,210
Silver Leaf	.....	372,900
Silver Queen	153,000	1,709,390
Silver Cliff	40,000	198,100
Townsite	.....	292,300
Temiskaming	60,000	1,114,880
T. and H. B.	60,000	,2253,666
Trethewey	63,000	3,232,470
Watts	.....	561,680

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the ore shipments for the week ending Nov 21st, and year to date:—

Boundary shipments	35,915	1,274,013
Rossland shipments	5,878	261,496
Slocan-Kootenay shipments	2,795	113,437

The total shipments for the past week were 44,588 tons, and for the year to date 1,648,946 tons.

Granby Smelter Receipts.

Grand Forks, B.C.

Granby	22,017	929,576

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	11,807	295,206

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	7,962	290,205

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Total	1,408	76,914

The total receipts at the various smelters for the past week were 43,194 tons, and for the year to date 1,619,503 tons.

The following are the ore shipments for the week ending Nov. 28:—

SLOCAN-KOOTENAY SHIPMENTS.

Whitewater Deep	79	807
Whitewater Zinc (Okla.)	462	6,507
Whitewater, milled	700	27,100
St. Eugene	356	23,737
Queen	27	918
Queen, milled	420	9,750
Second Relief, milled	145	2,780
North Star	101	3,902
Blue Bell	171	1,613
Rambler Cariboo	20	1,086
Granite-Poorman, milled	250	10,125
Kootenay Bell, milled	70	2,040
Idaho Alamo	81	818
Reco	32	456
Richmond	89	2,435
Nugget, milled	110	490
Early Bird	20	20
Elkhorn	17	17
Other mines	.....	21,986
Total	3,150	116,587

The total shipments for the past week were 46,980 tons, and for the year to date 1,695,926 tons.

B. C. COPPER CO.'S RECEIPTS.

Greenwoods, B.C.

Mother Lode	9,847	250,897
Oro Denoro	590	54,746
Snowshoe	1,200	1,200
Total	11,6[illegible]	[illegible]8,843

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	23,252	952,828

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Centre Star	4,762	159,408
Le Roi No. 2	574	26,738
Idaho Alamo	81	818
Snowshoe	1,019	27,631
I. X. L.	3	6
Blue Bell	131	1,613
St. Eugene	356	23,737
Whitewater Deep	79	807
Richmond	89	2,435
Reco	32	456
Rambler Cariboo	20	1,086
Early Bird	22	22
North Star	101	3,902
Elkhorn	17	17
Sally	20	128
Other mines	.....	48,750
Total	7,326	297,531

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from Jan. 1 to date:—

	Week ending Dec. 5. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	1,016,950
Coniagas	59,000	2,320,288
Cobalt Lake	.....	404,623
Crown Reserve	176,000	1,066,668
Cobalt Central	.....	527,935
Chambers-Ferland	.....	443,890
City of Cobalt	85,140	1,453,140
Drummond	.....	1,291,520
Foster	.....	437,300
Kerr Lake	.....	1,152,794
King Edward	.....	127,240
La Rose	282,000	8,642,370
McKinley-Darragh	60,000	3,281,470
Nipissing	237,870	8,588,240
Nova Scotia	.....	487,675
Little Nipissing	.....	40,110
Nancy Helen	.....	408,977
Peterson Lake	.....	41,237
O'Brien	128,030	6,548,887
Right of Way	.....	1,300,770
Provincial	.....	143,210
Silver Leaf	.....	372,900
Silver Queen	.....	1,709,390
Silver Cliff	.....	198,100
Townsite	.....	292,300
Temiskaming	60,000	1,174,980
T. & H. B.	60,000	2,313,666
Trethewey	127,200	3,359,670
Watts	.....	561,680

The total shipments for the week were 1,275,240 pounds, or 637 tons. Total shipments from Jan. 1 to date are 43,187,074 pounds, or 21,693 tons.

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	2,303	71,994
Queen	27	918
Other miens	555	6,887
Total	2,885	79,799

The tota lreceipts at the various smelters for the past week were 45,100 tons, and for the year to date 1,664,603.

MARKET REPORTS.

Dec. 8.—Connellsville coke, f.o.b. ovens:—

Furnace coke, prompt, $1.85 to $1.90.

Foundry coke, prompt, $2.15.

Metals.

Dec. 8.—Tin, Straits, 28.85 cents.

Copper, prime Lake, 14.50 cents.

Lake arsenical brands, 14.50 cents.

Electrolytic copper, 14.25 cents.

Copper wire, 15.75 cents.

Lead, 4.25 cents.

Spelter, 5.15 cents.

Sheet zinc, 7.50 cents.

Antimony, Cookson's, 8.125 cents.

Aluminum, 24 cents.

Nickel, 40 to 47 cents.

Platinum, $22.50 to $23.50 per ounce.

Bismuth, $1.75 per lb.

Quicksilver, $45 per 75 lb. flask.

Silver Prices.

		New York. cents.	London. pence
November	21	49 7-8	23 1 16
"	23	49 5-8	22 15 16
"	24	49 1-4	22 3-4
"	25	49 1 4	22 3-4
"	26	—	22 5 18
"	27	48 1-2	22 3 8
"	28	48	23 3-16
"	30	48 3-8	22 5-16
December	1	47 7-8	22 1-8
"	2	47 5-8	22
"	3	48 1-4	22 1-4
"	4	48	22 1 8
"	5	48 3 8	22 5 16
"	7	48 1-2	22 3-8
"	8	48 3-8	22 5 16

In the manufacture of alcohol from peat, a Danish company, with one experimental plant in Denmark and one in France, has found the cost to be about one-fourth of that made from potatoes. In the process of manufacture, the cellulose or fiber of the peat is converted by sulphuric acid into a soluble carbohydrate, and this is fermented by a special yeast.

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The Chemistry of Cyanide Solutions Resulting from the Treatment of Ores. By J. C. Clennell. Price, 2.50.

Across the San Juan Mountains. By T. A. Rickard. A graphic description of a picturesque ride of 400 miles on horseback through the San Juan Mountains in South-western Colorado. The work is written in vigorous and buoyant style, and the information contained therein, while appealing specifically to the geologist, prospector, and mining engineer, will also prove of great interest and enjoyment to the general reader. Small quarto, cloth, ornamental covers and profusely illustrated. Price, $1.00.

Ore Deposits. A discussion republished from the Engineering and Mining Journal, containing the recent contributions on the origin of ores. By S. F. Emmons, W. H. Weed, F. L. Ransome, C. R. Van Hise, T. A. Rickard, and C. W. Purington. The matter originally published has been revised and amplified. A review of the subject by the Editor of the Engineering and Mining Journal is added. It is an up-to-date discussion of a subject which is of great interest to mining men. The book contains 100 pages. Cloth. $1.00.

Mineral Resources of Canada. An illustrated handbook giving a brief outline of the economic minerals of Canada, and sketching the mineral resources of each province. The book contains 140 pages, 32 color engravings of the most important minerals. The latest mineral Resource Map of the Dominion, showing the chief mineral deposits, is also included. No such work has been attempted in Canada before. This volume should be in the hands of every one interested in the mining industry. The price of this volume is extremely moderate. $1.00.

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Rocks and Rock Minerals. By L. V. Pirsson, Professor of Geology in Yale University, 414 pages, 74 figures, 36 full-page half-tone plates. Not all mining men have an intimate knowledge of petrology, or the science of rocks. Even those who have had the advantage of a college course find that only a small residue of what they learned adheres to them. Most text-books on the subjects are cast into forms that repel the lay reader. Hence it is not easy for the beginner to acquire the rudiments of the science. "Rocks and Rock Minerals" is an attempt to present the outlines of petrology in such a way as to give an intelligent idea of the subject to readers quite unacquainted with the microscopic standpoint. Rocks and rock minerals are dealt with entirely from a megascopic, or practical outdoors, point of view. The book before us attains the desired object of giving the reader a knowledge of rocks and rock minerals without recourse to the microscope. It is a very fair introduction to the study of geology generally. Part III., in which igneous, stratified, and metamorphic rocks are described, is an excellent treatise in itself. Simplicity is the keynote of the book. Cloth. Price, $2.50 net.

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The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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CALLE DEL ELISEO, 37, MEXICO, D. F.

EDITORS: JOHN R. SOUTHWORTH, F.R.C.S. and PERCY C. HOLMES.

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CANADA DEPARTMENT OF MINES

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PUBLISHED BY THE GEOLOGICAL SURVEY BRANCH

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851 Coal
854 Asbestos
857 Infusorial Earth
858 Manganese
859 Salt
860 Zinc
869 Mica
872 Molybdenum and Tungsten
877 Graphite
880 Peat
881 Apatite
882 Copper
913 Mineral Pigments
953 Barytes

New Brunswick

661 Mineral Resources, by L. W. Bailey, 1897. Map No. 675, Scale 10 m. = 1 in. (10c)
799 Carboniferous System, by L. W. Bailey, 1900. (10c)
803 Coal Prospects in, by L. W. Bailey, 1900. (10c)
218 Geology of Eastern Part, by R. W. Ells, 1885. Map No. 230, Scale 4 m. = 1 in. (20c)
219 Carlton, and Victoria Counties, by L. W. Bailey, 1885. Map No. 231, Scale 4 m. = 1 in.
242 Victoria, Restigouche, and Northumberland Counties, by L. W. Bailey and W. McInnes, 1886.

Nova Scotia

243 Guysborough, Antigonish, Pictou, Colchester, and Halifax, by H. Fletcher and E. R. Faribault, 1886. (25c)
331 Pictou and Colchester, by H. Fletcher, 1890 91. (20c)
628 South-western Part, by L. W. Bailey, 1896. Map No. 647, Scale 8 m. = 1 in. (20c)
685 Sydney Coalfield, by H. Fletcher. Maps Nos. 652, 653 and 654, Scale 1 m. = 1 in.
871 Pictou Coalfield, by H. S. Poole, 1901. Map No. 833, Scale 25 ch. = 1 in. (10c)
797 Cambrian Rocks of Cape Breton, by G. F. Matthew.

MAPS

In addition to the Maps accompanying the foregoing list of reports, the following are available. Maps are listed at cost of printing, about 10c each.

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278 Cariboo Mining District. Scale 2 m. = 1 in.
870 Nicola Coal Basins. Scale 1 m. = 1 in.
604 Shuswap Geological Sheet. Scale 4m. = 1 in.
828 Boundary Creek Mining District. Scale 1 m. = 1 in.
792 West Kootenay Geological Sheet. Scale 4 m. = 1 in
791 West Kootenay Minerals and Striae. " " "
941 Preliminary Geological Map of Rossland and vicinity. Scale 1600 ft. = 1 in.
771 Preliminary Edition, East Kootenay. Scale 4 m. = 1 in
767 Geological Map of Crowsnest Coalfields. Scale 2 m. = 1 in.

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805 Explorations on MacMillan, Upper Pelly, and Stewart Rivers. Scale 8 m. = 1 in.
891 Portion of Duncan Creek Mining District. Scale 6 m. = 1 in.
894 Sketch Map Kluane Mining District. Scale 6 m. = 1 in
916 Windy Arm Mining District, Sketch Geological Map. Scale 2m. = 1 in.
991 Tantalus, and Five Fingers Coal Mines. Scale 1 m. = 1 in.

Alberta and Saskatchewan

594-596 Peace and Athabaska Rivers. Scale 10 m. = 1 in.
1010 Coal Areas of " " Scale 35 m = 1 in.
892 Costigan Coal Basin. Scale 40 ch. = 1 in.
8 Blairmore-Frank Coalfields. Scale 180 ch. = 1 in.

Manitoba

804 Map of part of Turtle Mountain showing coal areas. Scale 1½ m = .1 in.

Ontario

Western Sheets 4 m. = 1 in.

283 Rainy Lake.
720 Manitou Lake.
663 Ignace.
560 Seine River.
342 Hunter Island.
589 Lake Shebandowan.

Western Sheets 2 m = 1 in.

227 Lake of the Woods.
373 Rainy River.

Central Ontario Sheets 4 m. = 1 in.

770 Bancroft.
708 Haliburton.
789 Perth.
903 Ottawa and Cornwall.
750 Grenville.
660 Pembroke.
570 French River.
605 Manitoulin Island
630 Mississagi.
343 Sudbury.
606 Nipissing.
599 Timiskaming.

964 Geological Map of parts of Algoma and Thunder Bay 8 m. = 1 in.
944 Preliminary Map of Timagami and Rabbit Lakes. 1 m. = 1 in.
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375 Quebec
571 Montreal
665 Three Rivers

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976 The Older Copper-bearing Rocks of the Eastern Townships. Scale 8 m. = 1 in.
1007 Preliminary Map of Tps., East of Lake Timiskaming. 2 m. = 1 in.
918 Chibougamou Region. 4 m. = 1 in.
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667 Gold Areas in South-eastern part. 8 m. = 1 in.
287 Thetford and Coleraine Asbestos District. 40 ch. = 1 in

New Brunswick

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The mining laws of Ontario are liberal, and the prices of mineral lands low.

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When mines are discovered, they can be bought or leased from the Government. The purchase price is as follows:—

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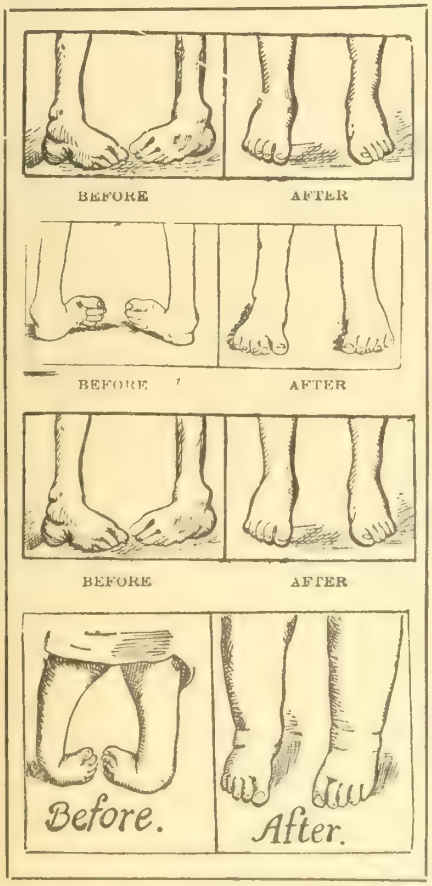
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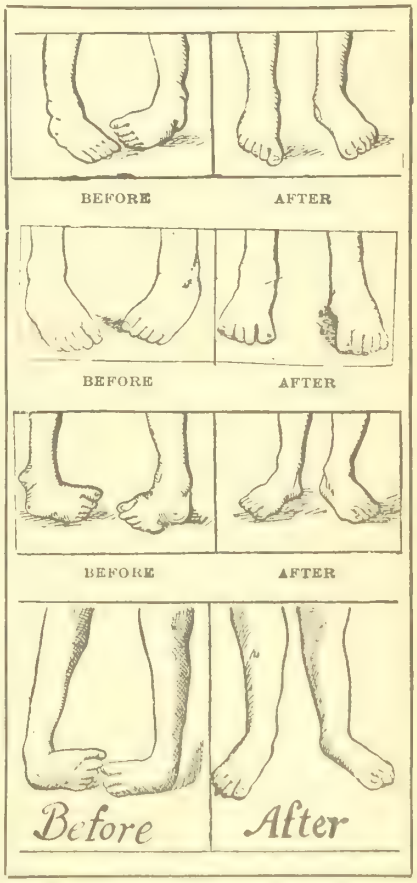
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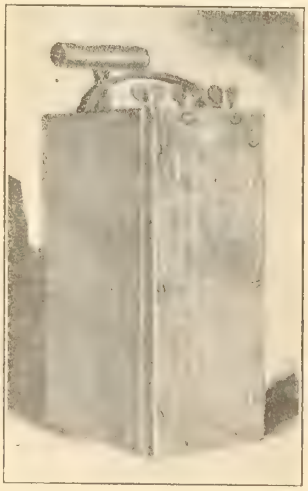
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